NISE
National Institute of Solar Energy

ANNUAL REPORT 2024-25

National Institute of Solar Energy

(An Autonomous Institute of Ministry of New and Renewable Energy, Government of India)


राष्ट्रीय सौर ऊर्जा संस्थान
एक पेड़ माँ के नाम
"स्वच्छता ही सेवा"
National Institute

ANNUAL REPORT

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(An Autonomous Institute of Ministry of New and Renewable Energy, Government of India)
Gurugram - Faridabad Road, Gwal Pahari,
Gurugram - 122003, Haryana

NATIONAL INSTITUTE OF SOLAR ENERGY

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1	Secretary, Ministry of New and Renewable Energy (MNRE)	President (Ex-officio)
2	Financial Advisor, MNRE	Member (Ex-officio)
3	Joint Secretary, MNRE	Member (Ex-officio)
4	Joint Secretary (Solar)/Advisor (Solar), MNRE	Member
5	Managing Director, Solar Energy Corporation of India (SECI)	Member
6	Director General, Central Power Research Institute (CPRI)	Member
7	Director, Rajasthan Renewable Energy Corporation Limited (RRECL)	Member
8	Director, Karnataka Renewable Energy Development Limited (KREDL)	Member
9	Shri Ravi Reddy, Chairman, National Solar Energy Federation of India (NSEFI)	Member
10	Shri Manoj Upadhayay, Founder and Chairman, ACME Solar	Member
11	Dr. Mohammad Rihan, Director General, National Institute of Solar Energy (NISE)	Member
12	Dr. Chandan Banerjee, Deputy Director General, NISE	Member
13	Dr. Avadhesh Yadav, Deputy Director General, NISE	Member
14	Prof. Nilanjan Senroy, Electrical Engineering Department, Power Grid Chair Professor, Indian Institute of Technology Delhi (IIT Delhi)	Member
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16	Prof. Dinesh Kabra, Department of Physics, Indian Institute of Technology Bombay (IIT Bombay)	Member
17	Prof. Vamsi Krishna, Department of Energy Science and Engineering, IIT Delhi	Member
18	Dr. Jai Prakash, Deputy Director General, NISE	Member Secretary
Special Invitee: Representative nominated by Secretary, Department of Science & Technology (DST), New Delhi		

**Constituted by MNRE vide Order No. 354/8/2018-NSM dated 04.09.2024*

सत्यमेव जयते

संतोष सारंगी, भा.प्र.से.
सचिव

SANTOSH SARANGI, IAS
Secretary

International Year of Cooperatives 2025
Cooperatives Build a Better World

भारत सरकार
नवीन और नवीकरणीय ऊर्जा मंत्रालय
GOVERNMENT OF INDIA
MINISTRY OF NEW AND RENEWABLE ENERGY

President's Message

As we continue to witness the transformative progress in solar energy, I would like to take this opportunity to present the Annual Report of National Institute of Solar Energy (NISE) with regard to the past year. NISE's work remains closely aligned with the objectives of the National Solar Mission and the various initiatives undertaken by the Ministry of New and Renewable Energy (MNRE) to promote solar energy adoption across the country. As a nodal centre on solar, NISE drives innovation and R&D focused on solving real-world challenges in the renewable energy sector.

Being an autonomous institute of MNRE, NISE remains instrumental in implementing MNRE's flagship programs—ALMM, the PLI Scheme, PM-KUSUM, and PM Surya Ghar, while also advancing solar skill development through Suryamitra and Varunmitra during 2024–25. With targeted training programs, impactful outreach events, and the steady advancement of the Suryamitra programme, their focus on capacity building remained strong.

This year, the institute also achieved significant milestones in research and infrastructure development. Noteworthy accomplishments include technological advancements in PV cell development, comprehensive studies on projected PV waste generation, methodology for GIS-based assessments of floating solar potential, and optimization of agrivoltaic systems across fifteen agro-climatic zones. This strong commitment to scientific excellence is further reflected in the Institute's intellectual property filings and numerous peer-reviewed publications.

These efforts were further strengthened through active collaboration with industry and academic institutions, enabling the co-development of advanced technologies and real-world pilot projects, which not only accelerated innovation but also ensured the practical relevance and scalability of solutions emerging from NISE.

I am pleased to present the Annual Report of NISE for the fiscal year 2024–25. The achievements documented herein stand as a testament to the Institute's unwavering dedication, technical acumen, and visionary leadership. I am confident that NISE will continue to play a vital role in advancing India's energy transition and contributing meaningfully to a sustainable and energy-secure future.

(Santosh Sarangi)

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राष्ट्रीय सौर ऊर्जा संस्थान
(नवीन एवं नवीकरणीय ऊर्जा मंत्रालय, भारत सरकार का स्वायत संस्थान)
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डॉ. मोहम्मद रिहान / Dr. Mohammad Rihan
महानिदेशक / Director General

Advancing Together Toward Progress

It gives me immense pleasure and satisfaction to present the Annual Report of the Institute for the Financial Year 2024–25. This report encapsulates our sustained efforts, strategic initiatives, and significant achievements in advancing the nation's renewable energy goals through innovation, technical excellence, and capacity building. Our technical expertise, rigorous training frameworks, and policy-level contributions have further strengthened India's clean energy ecosystem.

We also enhanced our R&D capabilities, expanded our testing infrastructure, and fostered new collaborations with academic institutions, industry partners, and international organizations. These efforts have not only improved the quality and reliability of solar technologies but have also positioned the Institute as a center of excellence in renewable energy innovation and human resource development.

Throughout the year, NISE continued to play a pivotal role in supporting the Ministry of New and Renewable Energy (MNRE) in the effective implementation of key initiatives such as the Approved List of Models and Manufacturers (ALMM), the Production Linked Incentive (PLI) Scheme, the PM-KUSUM programme, and the PM Surya Ghar initiative. Additionally, through the Suryamitra and Varunmitra Skill Development Programs, the Institute reinforced its commitment to strengthening India's skilled solar workforce.

On the research and development front, NISE made significant progress during the year. Our PV R&D Laboratory developed a low-cost, semi-batch synthesis process based on the Stöber method for producing monodisperse silica particles—enabling efficiency improvements in nanostructured and perovskite solar cells. This was complemented by the fabrication of inverted pyramid light-trapping structures on silicon wafers, demonstrating a substantial reduction in optical reflectance, with great promise for photovoltaic and optoelectronic applications.

NISE has undertaken a study that aims to estimate the projected location-specific PV waste generation in India through 2047 by analyzing historical installation data from 2016– 2022, providing critical insights for future waste management policies and infrastructure planning. To promote integrated land use, NISE conducted a comprehensive study on agrivoltaic systems across India's fifteen agro-climatic zones, identifying optimal configurations for energy yield per acre. The Centre of Excellence (CoE) for AgriPV actively developed India-specific guidelines, conducted field assessments across multiple states, and engaged with stakeholders through webinars and outreach programs.

In support of floating solar expansion, the Institute developed a robust GIS-based methodology for assessing and quantifying the potential of floating solar PV installations across the country. The assessment included an in-depth analysis of various parameters, including water bodies, water availability (Seasonality) and bathymetry (Water depth) as well as the parameters used in ground-

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mounted solar potential assessment, such as road network, transmission substations and solar irradiance data to ensure optimal site selection, efficiency, and sustainability to deliver a high-resolution assessment of feasible sites. The methodology has been successfully piloted using the Hirakud Reservoir.

In the solar thermal domain, several products with thermal storage, including Solar Cooker, Solar Cabin and Instant Solar Geysers were developed and completed the design and lab testing phases.

In line with its mission of capacity building, NISE conducted 16 training programs involving 434 participants, including 59 international trainees under ITEC. The Institute also organized 39 technical visits, benefitting over 1,300 participants, and hosted multiple outreach events, including the 12th Foundation Day, which welcomed over 200 school students. NISE's campus engagement initiatives reached more than 475 students from 8 schools.

Under the Suryamitra Skill Development Programme, NISE facilitated training through a wide network of Training Partners/Training Centers across the country, promoting regional inclusivity and accessibility. So far over 60,000 individuals have been trained and more than 30,000 placed in the solar sector. The launch of Upskilling and Reskilling modules under the PM Surya Ghar initiative, and the Master Trainers Programme for NSTI faculty undertaken during the year, reflect our evolving response to sectoral demands.

NISE's consultancy expertise was demonstrated through 12 technical assignments for public and private stakeholders, while its commitment to collaboration was strengthened through 21 MoUs focused on R&D, training, and knowledge exchange.

In support of ALMM enforcement, the Institute conducted 131 inspections across 93 manufacturing units, covering a cumulative capacity of 72.40 GW/year.

Our research contributions during the year included the filing of one national patent, 22 journal publications, 4 conference papers, and one book chapter, showcasing the Institute's commitment to scientific excellence.

As we look ahead, NISE remains committed to its role as a national centre of excellence for solar energy supporting India's mission for energy transition and sustainability. Our vision is not only to lead in solar technology development but also to enable the nation to achieve its ambitious renewable energy targets through innovation, collaboration, and skill empowerment.

I would like to express my sincere appreciation to the MNRE for its continued guidance, and to the entire NISE team for their dedication and hard work. I invite all readers to explore this report, which serves as a testament to our collective commitment toward a cleaner and more sustainable energy future for India.

(Dr. Mohammad Rihan)

Executive Summary

National Institute of Solar Energy (NISE) is an autonomous specialized institute of Ministry of New and Renewable Energy (MNRE), Government of India, mandated for research and development, solar component testing, capacity building, and development of solar products and applications. The technical support of NISE complements the requirements of MNRE to become a self-reliable renewable power producing nation and accept the series of challenges intervened in amidst of implementation of the National Solar Mission (NSM).

In FY 2024–25, NISE continued to support the Ministry in implementing key national initiatives, including Approved List of Models & Manufacturer (ALMM) of Module & Cell, Production Linked Incentive (PLI) scheme, Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan Yojana (PM KUSUM), PM Surya Ghar initiative, and Suryamitra and Varunmitra Skill Development Programs. Major activities undertaken by NISE during FY 2024-2025 and their key achievements are outlined here:

- To enhance the efficiency of nanostructured solar cells, particularly radial junction solar cells, and improve the stability of perovskite solar cells, the PV R&D Laboratory has developed a low-cost, semi-batch synthesis process based on the Stöber method. This method enables the controlled production of monodisperse silica particles ranging from the nanoscale to microscale. By precisely adjusting key reaction parameters— such as precursor, hydrolyzing agent, and catalyst concentrations—the process allows fine-tuning of particle size, morphology, and distribution, which is critical for optimizing performance in advanced solar cell applications. The method has successfully produced monodisperse silica particles with diameters from 0.67 µm to 3.2 µm.
- Monosized silica particles were used as an etching mask to fabricate periodic inverted pyramid structures on the top surface of Si wafers without doing complicated lithographic steps. The inverted pyramid arrays demonstrated a substantial reduction in reflectance. For the 300–1000 nm range, the average reflectance values were 10.5%, 5.8%, and 2.9% for 2 min, 4 min, and 7 min of etching, respectively. In the 1100–2000 nm range, these values were 34.9%, 20.3%, and 14.7%, respectively. This significant reduction in reflectance across the entire spectral range (300–2000 nm) confirms the enhanced light-trapping capability of the inverted pyramid structures, making them highly effective for photovoltaic and optoelectronic applications.
- Compound perovskite $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}$ $\{PbTiO_3\}_x$ (PMN-PT) single crystals were synthesized using a solid-state technique, and their structural and optical properties were investigated. X-ray diffraction patterns confirmed a monoclinic structure for compositions with x = 0.1, 0.2, 0.3, and 0.4, showing reflection planes <100>, <110>, <111>, <200>, <210>, and <211>. The presence of prominent peaks indicates a dominant pyrochlore phase. As the $PbTiO_3$ content increases, lattice distortion becomes more significant, leading to noticeable modifications in the monoclinic symmetry of the PMN-PT structure. The presence of smaller grains increases the number of grain boundaries, which can negatively impact properties such as dielectric strength and electrical conductivity. Grain boundaries may obstruct charge carrier mobility or act as sites for dielectric breakdown, ultimately affecting the performance of PMN-PT-based devices.
- NISE has undertaken a study that aims to estimate the projected location-specific PV waste generation in India through 2047 by analyzing historical installation data from

2016–2022 and incorporating assumptions reported in the literature. A solar panel weighing 0.672 kg/W_p was analyzed by removing each component and calculating its composition. The panel consists of 51.6% glass, 20.2% aluminum frames, 14.9% solar cells, 6.9% metal connections, 3.6% EVA & back sheet, and 2.1% junction boxes in terms of kg/W_p. The study provides state-wise projections of PV waste considering the component-wise weight/W_p, identifying Rajasthan, Karnataka, and Tamil Nadu as the largest contributors. By 2047, India is projected to generate approximately a cumulative total of 288 million tons of photovoltaic (PV) waste considering PV modules only. This research will help serve as a strategic guide for policymakers, industry stakeholders, and waste management authorities by informing capacity planning, policy development, and infrastructure investments.

- NISE conducted a study on the design and simulation of agrivoltaic power plants for India's fifteen agro-climatic zones. For each zone, PV power plants were designed with different orientations, and simulations were conducted to determine the potential energy output and the size of the installations for 1 acre of land. Simulation results show that a maximum energy of approximately 6,13,936 kWh/ yr can be produced in the Western Dry Region using bifacial modules, which refers to an energy production of 327.04 kWh/acre of land. The minimum energy of approximately 2,64,364 kWh/yr can be produced in the Eastern Himalayan Region, which refers to an energy production of 193 kWh/ acre of land.
- Centre of Excellence (CoE) for AgriPV at NISE undertook a series of impactful activities to advance the adoption and understanding of AgriPV systems in India. Key initiatives included the development of a dedicated AgriPV webpage and the creation of a two-page informative brochure to raise awareness among stakeholders. The CoE conducted an impact assessment of crops under AgriPV installations and developed a comprehensive crop suitability matrix. A set of India-specific guidelines for AgriPV systems was prepared to support standardized implementation. Field visits were carried out across six operational AgriPV sites in Maharashtra, Gujarat, Madhya Pradesh, and Delhi to document best practices and challenges of AgriPV systems under Indian conditions. The CoE organized five national webinars covering diverse themes, from technical design to policy frameworks, with participation from industry experts, developers, and farmers. Extensive farmer engagement was facilitated through PM-KUSUM awareness workshops held at multiple Krishi Vigyan Kendras (KVKs) across India, as well as through participation in the Krishi Udyog Samagam 2025 in Indore.
- Floating Solar PV Potential Assessment – To support India's renewable energy goals, NISE has developed a robust methodology for assessing and quantifying the potential of floating solar PV installations across the country. NISE adopted a data-driven analytical approach, leveraging high-resolution GeoBase data to ensure precision and reliability. The assessment included an in-depth analysis of various parameters, including water bodies, water availability (Seasonality) and bathymetry (Water depth) as well as the parameters used in ground-mounted solar potential assessment, such as road network, transmission substations and solar irradiance data to ensure optimal site selection, efficiency, and sustainability to deliver a high-resolution assessment of feasible sites. Due to the limited visibility of hydro lakes on the Indian map, the methodology for evaluating the floating solar potential has been demonstrated using the Hirakud Reservoir as a representative case study. The analysis of the Hirakud Reservoir revealed that out of the total water surface area of 499.48 km^2 approximately 204.53 km^2 met the defined criteria for year-round water availability and suitable depth (3 to 30 meters).

- NISE has undertaken several solar thermal product developments with thermal energy storage such as Solar Cooker, Solar Cabin and Instant Solar Geyser. The system has successfully completed the design and laboratory testing phase, and pilot deployments are being planned to evaluate field performance and user acceptance.
- During the year, NISE conducted a total of 16 training programs catering to the needs of both national and international stakeholders. These training sessions were conducted in various formats—offline, online, and hybrid—ranging from introductory to advanced level. A total of 434 participants (including 59 international participants under ITEC programs and 375 national participants) benefited from the training initiatives of NISE
- As part of the 12th Foundation Day celebrations NISE organised an Open Day event held on 25th October 2024, engaging the students and general public. Over 200 students from 5 government and private schools participated and were educated through live demonstrations of solar products, poster presentations, and guided laboratory visits. Additionally, during FY 2024-25 total 8 Schools visited NISE campus and around 475 students were given exposure in the field of solar energy
- NISE organized a total of 39 technical visits, reaching approximately 1,330 participants and facilitating exposure to solar and renewable energy technologies for diverse groups. These visits promoted awareness and knowledge exchange, introducing emerging renewable energy solutions to a wide range of audiences. Among the participants, 475 school students from 8 different government and private schools were engaged, while 266 college students, 248 government officials, 186 professionals from the private sector, and 155 international participants also took part.
- NISE has been entrusted with the responsibility of coordinating and implementing MNRE's Suryamitra Skill Development programme, ensuring a structured and impactful training approach to support the rapid expansion of India's solar energy ecosystem. Training are being delivered through a wide network of Training Partners/ Training Centers across the country, promoting regional inclusivity and accessibility. Under the Program, 60,685 individuals have successfully completed the training and 30,386 trained Suryamitras have been placed in employment within the solar energy sector. To bridge the skill gap and further enhance the employability of trained Suryamitras, a "Networking Event with Suryamitra Training Partners, Solar PV Developers, and EPCs" was held at NISE on 17th December, 2024.
- To support the goals of the PM Surya Ghar initiative and meet the rising demand for a skilled solar workforce, NISE developed Upskilling and Reskilling training modules. These were officially approved by the MNRE on 9th October, 2024, and are now being implemented nationwide. This initiative spans all expertise levels from installers to supervisors ensuring regional inclusion and widespread access to solar training. During the year, NISE organized a Master Trainers Training Programme on Solar PV Installation for faculty members of the National Skill Training Institutes (NSTIs) from 24th to 25th June, 2024. The programme was conducted to enable the participants to carry out training activities under the scheme.
- During the year, a total of 12 technical consultancy assignments were carried out by NISE for various public and private companies including Development of green and climate resilient infrastructure through solarization in health care facilities (HCFs) in India, Technical Support in Solar PV parks and Implementation of qualitative requirements and technical acceptance for setting up of PV module manufacturing facility in India under PLI scheme.
- During the year NISE has signed a total of 21

Memorandum of Understating (MoUs) with both Government and Private organizations for undertaking various collaborative activities including (i) Research and Innovation; (ii) Skilldevelopment Training Program; (iii) Knowledge Exchange for Product Development, Testing, and Project execution; (iv) Joint association for organizing Seminars, Conferences, Training, and Workshops.

- During the FY 2024-25, NISE conducted a total of 131 ALMM inspections of Solar PV Module Manufacturing Plants against applications of New enlistment, Renewal, Model Addition, & Capacity Addition. During the FY 2024-25, NISE inspected a cumulative manufacturing capacity of 72.40 GW/Year. As on 31st March 2025, a total of 93 manufacturing plants are enlisted in ALMM with a total installed manufacturing capacity of 74.23 GW/Year.
- The research activities undertake by NISE during the year resulted in filing of 1 National Patent, 22 Journal Publications, 4 Conference Papers and 1 Book Chapter.

This Annual Report comprehensively details all the activities undertaken by NISE during the Financial Year 2024–25, presented across ten chapters.

CONTENTS

Chapters

CHAPTER 1

Introduction

National Institute of Solar Energy (NISE) an autonomous institute of the Ministry of New and Renewable Energy (MNRE), Government of India, serves as the apex national institution driving research, innovation, testing, and capacity building in the field of solar energy. NISE was established in 2013 by upgrading the Solar Energy Centre to a more flexible and autonomous structure and is registered as a society under the Haryana Registration and Regulation of Societies Act, 2012 (Registration No.: HR-018-2013-01092).

The primary aim was to enable greater industry participation, foster international cooperation, and create an agile institution capable of keeping pace with global technological developments. NISE is positioned as a knowledge and implementation hub supporting entrepreneurs, researchers, industries, and policymakers in achieving India's renewable energy targets through a wide spectrum of activities that span across:

- Research and development in solar photovoltaic (PV), thermal, and hybrid systems.
- Performance evaluation and certification of solar energy products
- Development of solar resource assessment tools and forecasting models tailored to Indian climatic conditions.
- Technical consultancy services to central and state government bodies, international agencies, and industrial stakeholders.
- Skilling and capacity building through national and international training programs, academic collaborations, and curriculum development.
- Strategic leadership in emerging areas such as Green Hydrogen, Building Integrated Photovoltaics (BIPV), AgriPV, and solar waste management.

Situated in a 200-acre lush green campus at Gwal Pahari on the Gurugram-Faridabad Road in Haryana, the institute is approximately 22 km from the Indira Gandhi International Airport and 30 km from the New Delhi Railway Station. Figures 1.1 and 1.2 show the Surya Bhawan and Aditya Bhawan buildings of NISE.

The technical support provided by NISE complements the requirements of MNRE in making

Figure 1.1: Surya Bhawan, NISE

Figure 1.2: Aditya Bhawan, NISE

India a self-reliant renewable power-producing nation and addressing the series of challenges encountered during the implementation of the National Solar Mission (NSM) and the National Green Hydrogen Mission (NGHM).

1.1 Vision of NISE

To establish itself as one of the world's leading referral institutes in the field of solar energy through resource assessment; research and development; design, development, and demonstration of solar energy technologies for various applications; testing and standardisation; monitoring and evaluation; economics and policy planning; human resource development; and active collaborations with prominent national and international organisations.

1.2 Objectives

The main objectives of NISE are as follows:

(i) To function as a national research organisation for undertaking and supporting research and development projects on various aspects of solar energy technologies.

(ii) To act as an apex organisation for testing, development of specifications, and standards.

(iii) To create skilled manpower and offer consultancy services on solar energy technologies.

1.3 Quality Policy of NISE

NISE is committed to providing performance evaluation and testing services for solar cells, PV modules, solar water pumping systems, inverters, charge controllers, batteries, advanced lighting systems, and calibration services for pyrheliometers and pyranometers. The test facilities established at NISE meet the requirements to conduct tests as per national and international standards.

This is achieved by using the best engineering practices, continuous upgradation of infrastructure, and updating state-of-the-art test facilities, test methods, and testing personnel, along with continuous improvement in the effectiveness of the Quality Management System as per the international standard ISO 17025:2017.

1.4 Thrust Areas

The basic function of NISE is to serve as a technical focal point in solar energy-related areas. NISE is committed to performing at its best in all spheres relating to solar energy and continually provides assistance and guidance with high-quality standards in its work. NISE recognises the development process and continuously adapts to significant and notable changes in the solar industry. NISE has the following thrust areas for its contribution and knowledge exploration:

(i) To work increasingly in frontline areas that transcend disciplines, the following thrust areas form part of this effort:

- Research and development in solar photovoltaic and solar thermal systems
- Solar resource assessment
- Testing of solar systems and devices (both large and small)
- Standardisation
- Database management and information dissemination
- Capacity building, training, teaching, and visitors' programmes
- Development of solar energy products and hybrid systems
- Consultancy services, monitoring, and collaborations (national and international)
- Innovations, solar product development, and commercialisation
- Solar hydrogen and fuel cells

(ii) To have a perception and value system appropriate to the pursuit of high engineering science to meet the critically evaluated needs of the industry.

(iii) To maintain and foster interactive linkages with leading technological institutions and research institutes in India and abroad.

(iv) To act as an interface between government, industry, academia, and individuals.

1.5 Major Activities

The main activities of the institute include:

(i) Assisting the Ministry in implementing the NSM objectives through appropriate mechanisms, evolving Science and Technology (S&T) programmes and projects, managing special projects, and overseeing and coordinating with all relevant stakeholder agencies in pursuit of the above objectives.

(ii) The institute is responsible for providing thrust to R&D in solar energy and related technologies under the Mission. It facilitates work related to demonstration and technology validation projects and also considers sector-specific R&D needs to commercialise solar applications. These target sectors include buildings, rural areas, and industries for lighting and other applications. The objective of solar applications and R&D efforts also includes replacing kerosene and diesel used by the above sectors.

(iii) The institute is responsible for R&D, resource assessment, training, and testing/ standardisation work assigned to it by the Ministry from time to time. It maintains a data bank for use by industry and other institutions.

(iv) The institute undertakes R&D projects on different aspects of solar energy technologies, hybrid systems, and storage techniques/ systems.

(v) The institute also carries out internal administrative functions, international cooperation projects on research, training, and testing, as well as technology validation.

(vi) The institute also works as the Secretariat for the R&D Advisory Council. The Solar Research Advisory Council facilitates the development of a technology roadmap and provides inputs on all matters related to R&D and capacity building to the Mission Steering Group. The institute also works closely with the Solar Energy Corporation of India, set up by the Ministry for the implementation of the Mission.

(vii) The institute, under the guidance of the Ministry and the Mission Steering Group, is responsible for coordinating with (i) other Centres of Excellence identified under the Mission, (ii) R&D projects funded in the field of solar energy in the country, and (iii) other S&T Ministries/organisations in the country.

(viii) The institute strives to bridge the gap between existing R&D institutions and industry and brings the industry on board through partnership programmes and projects.

(ix) The institute collaborates with international S&T organisations for R&D and capacity-building activities in solar energy, as assigned by the Ministry from time to time.

(x) The institute keeps track of the latest global developments through technology forecasting and foresighting related to solar energy and storage technologies, and provides inputs to the Ministry and the Mission Steering Group for the accelerated development of indigenous solar energy technologies and industry in the country.

(xi) The institute also provides technical support to other R&D and testing organisations, as considered necessary.

(xii) The institute assists the Ministry in the preparation of a technology roadmap and related S&T policies for effective implementation of the Mission's S&T component.

(xiii) The institute also coordinates the technical monitoring of projects covered under the S&T roadmap for the Mission and undertakes technical studies and evaluations.

(xiv) The institute is eligible to receive research grants from MNRE and other Ministries/ organisations, including international funding, to carry out various assigned tasks and R&D activities.

(xv) The institute also supports capacity building and assists students, teachers, and research personnel pursuing higher degrees, including Ph.D. programmes. It develops suitable linkages with various academic and research organisations for this purpose.

(xvi) Any other tasks assigned by the Government from time to time.

1.6 Organisation Layout of NISE

The rules of affairs at NISE are managed by a Governing Council (GC), a Finance Committee (FC), and an Executive Committee (EC). The institute is headed by a Director General, who is the Principal Executive Officer of the Society and is responsible for exercising general supervision over all scientific and industrial research and other activities of the institute. Various divisions of NISE are led by Deputy Director Generals for technical and administrative activities, and are supported by Directors, the Administrative Officer, Deputy Directors, Assistant Directors, and Executive Assistants-I.

1.7 Governing Council

The affairs of NISE are managed by a Governing Council (GC), chaired by the Secretary, MNRE (ex-officio President, NISE), and comprising 18 members from MNRE, industry, premier research institutions, government departments, and solar energy experts from reputed organisations.

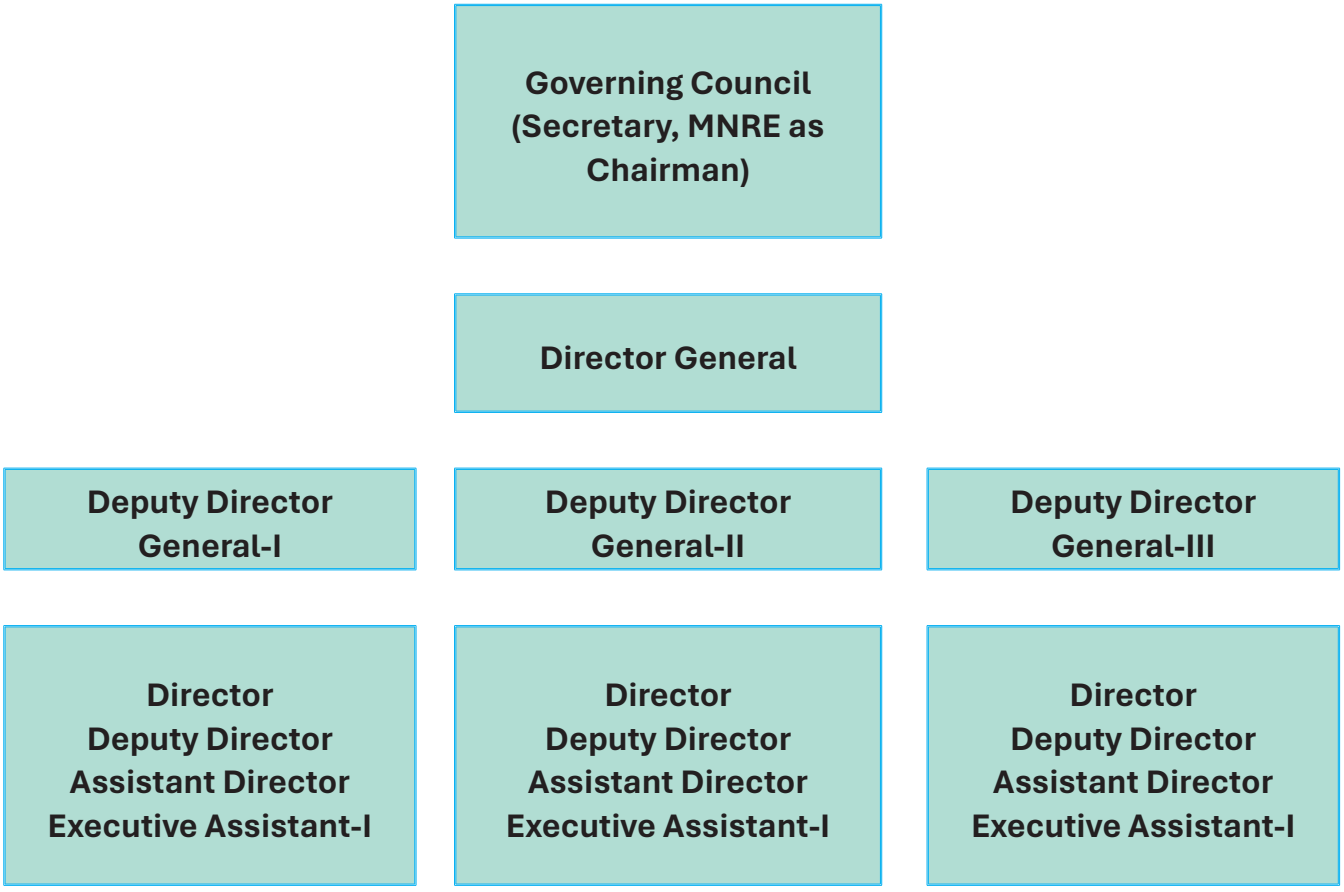

Figure 1.3: Organisational Layout of NISE

1.8 Executive Committee

The Executive Committee (EC) of NISE takes decisions related to technical, administration, policy, finance & accounts-related matters and improves the overall functioning of the institute. EC has 5 members: DG, NISE as the Chairman, Deputy Director General-I, Deputy Director General-II, and Director as members, and Deputy Director (Administration)/Administrative Officer as Member Convener.

1.9 Finance Committee

The Finance Committee (FC) of NISE approves the Annual Accounts of NISE before submission to the GC and Annual General Meeting (AGM). The FC is chaired by the Financial Advisor, MNRE and includes the Joint Secretary (Solar), MNRE, and DG, NISE as its members.

1.10 Right to Information Act

The institute is implementing the Right to Information (RTI) Act, 2005, in accordance with the guidelines issued by the Department of Personnel and Training (DoPT), the Central Information Commission, and the Ministry of Home Affairs. The procedure and other details for seeking information under the RTI Act, 2005, are available on the institute's website: www.nise.res.in.

The institute has designated Central Public Information Officers (CPIOs) and a First Appellate Authority to respond to RTI applications and first appeals. A list of the CPIOs and the First Appellate Authority is provided in Table 1.1. The respective CPIOs and the First Appellate Authority respond to RTI applications/appeals within the stipulated timelines, to the extent possible.

The progress report in terms of RTI Applications/ First Appeals received, disposed-off, and pendency during the year (from 01st April 2024 to 31st March 2025) is hereby given in Table 1.2.

Table 1.1: Name and Designation of the CPIOs and First Appellate Authority in NISE under Right to Information Act, 2005

Sl. No.	Subject	CPIO	First Appellate Authority (FAA)
1	All technical matters concerning Research and Development, Technology and Laboratory	Dr. Prashant Misra Director (Technical)	Dr. Chandan Banerjee Deputy Director General (Technical)
2.	All Administrative Matters	Shri Anil Kumar Yadav Director (Administration)	

Table 1.2: Status of RTI Application received during 2024-25

Item	Received	Replied	Pending as on 31.03.2025*
RTI Applications	54	48	06
First Appeals	07	06	01

**As per the Quarterly report submitted on RTI Portal.*

1.11 Recruitment status

Group-wise sanctioned and in-positioned posts in NISE as on 31st March 2025 as follows:

S. No.	Name of the post	Level	No. of Posts		Total	Status
			Technical	Admin		
1.	Director General	14	01	00	01	Post Filled
2.	Deputy Director General	13A	03	00	03	All Posts Filled DDG: 03 (UR)
3.	Director	12	02	01	03	All Posts Filled Director (Tech): 02 (UR) Director (Admin): 01 (UR)
4.	Deputy Director	11	06	02	08	All Posts Filled Dy. Director (Tech): 05 (UR), 01 (OBC) Dy. Director (Admin): 02 (UR)
5.	Administrative Officer	11	-	01	01	Post Filled AO: 01 (UR)
6.	Assistant Director	10	07	02	09	All Posts Filled Assistant Director (Tech): 04 (UR), 01 (UR-PwBD), 01 (OBC), 01 (SC) Assistant Director (Admin): 02 (UR)
7.	Office Secretary	9	-	01	01	Vacant: 01 Post (UR) Process for re-designation in progress.
8.	Office Secretary-I	8	-	03	03	Vacant: 03 Post (UR) Post under process for re-designation: 02 (UR) Post under revival / fresh creation: 01 (UR)
9.	Executive Officer	8	04	-	04	Vacant: 04 Posts: 03 (UR), 01 (OBC) All posts under revival / fresh creation.
10.	Executive Assistant-I	7	08	-	08	Vacant: 05 Posts: 03 (UR), 01(EWS), 01 (OBC), 01 PwBD(Horizontal Reservation) Post Filled: 03 (UR:01, OBC:01, SC:01)
	Total		**31**	**10**	**41**	

Abbreviations: UR-Unreserved, SC-Scheduled Caste, OBC-Other Backward Caste, PwBD-Person with Benchmark Disability, EWS-Economic Weaker Section.

CHAPTER 2

Research & Testing Facilities

NISE serves as a premier research and testing institution dedicated to advancing solar energy and allied technologies in India. To support its mission, NISE has developed a comprehensive infrastructure featuring state-of-the-art laboratories equipped with advanced testing and characterization tools. These facilities enable cutting-edge research in photovoltaic cells and modules, solar thermal systems, battery storage, power electronics, and green hydrogen applications.

Institute's core competencies extend beyond conventional testing to include applied research, performance evaluation, and technology standardization. The Institute fosters innovation through experimental and theoretical projects that aim to enhance the efficiency, reliability, and sustainability of solar energy systems. Major facilities at NISE include:

- Advanced Solar Cell Characterization Facility
- Indoor and Outdoor Solar PV Module Testing Laboratories
- Power Electronics Laboratory
- Battery Test and Characterization Laboratory
- Advanced Solar PV System and Lighting Laboratory
- Solar Water Pumping System Testing Facility
- Solar Water pumping and off-grid applications
- Green Hydrogen Production and Dispensing Station

These facilities position NISE as a central hub for technological innovation and quality assurance in the renewable energy sector, supporting industry stakeholders, policymakers, and researchers alike.

2.1 Advanced Solar Cell Characterization Facility

The Advanced Solar Cell Characterization Laboratory at NISE is a state-of-the-art facility designed to support high-precision analysis of photovoltaic materials and devices. The lab features an ISO Class 8 cleanroom and is equipped with a comprehensive suite of advanced characterization tools, including:

Figure 2.1: Field Emission Scanning Electron Microscope

Figure 2.2: Spectroscopic Ellipsometer

- Spectral Response Measurement System (QESRMS)
- Spectroscopic Ellipsometer
- Optical Microscope
- Semi-Automatic Four-Probe Resistivity Meter
- Electrochemical Capacitance Voltage (ECV) Profiler
- Surface Profilometer
- Field Emission Scanning Electron Microscope (FESEM) with EDS capability

These instruments facilitate the precise measurement of optical constants in textured and thin-film solar cells, as well as film thickness, surface roughness, two-dimensional stress, and surface texture. The lab also supports automated single- and multi-point mapping of sheet resistance and resistivity in silicon wafers and solar cells.

In addition, the facility enables advanced analysis such as Laser Ablation and Local Back Surface Field (LBSF) microstructure characterization of front-side metallization, contributing to research in device optimization and process development for next-generation solar cells.

2.2 Solar PV Module Testing Laboratory (Indoor)

During the reporting period, the renovation of the PV Module Indoor Test Facility was successfully completed. The upgraded facility is now fully operational and awaiting NABL accreditation. As part of the modernization initiative, the following equipment was installed and commissioned during the last financial year:

- Hail test facility
- Salt Mist Test facility
- Fire test facility
- Electrical & Thermal calibration facility

These upgrades enhance the facility's capability to conduct accurate and reliable performance, safety, and reliability testing of photovoltaic modules in accordance with national and international standards.

2.3 Solar PV Module Testing (Outdoor)

The PV Module Outdoor Testing Facility enables performance evaluation of photovoltaic modules under real-world environmental conditions. Test results are normalized to standard reference conditions in accordance with IEC 60891:2021. The

Figure 2.3: Salt Mist Chamber

Figure 2.4: Module Breakage Test

Figure 2.5: Stabilization Test

Figure 2.6: Solar PV Module Testing (Outdoor)

facility supports long-term outdoor performance and reliability testing, providing critical insights into the durability and operational effectiveness of both grid-connected and off-grid PV systems.

In addition to module-level testing, the facility conducts on-site health and performance assessments of solar power plants to verify compliance with performance guarantees. These assessments contribute to quality assurance, system optimization, and lifecycle analysis. Furthermore, the facility enables the evaluation of degradation behaviour and identification of failure modes in PV modules exposed to varying climatic conditions, aiding in the development of more robust and climate-resilient solar technologies.

2.4 Power Electronics Laboratory

The Power Electronics Laboratory is dedicated to the testing and evaluation of power conditioning units (PCUs), including hybrid, standalone, and grid-connected inverters, as well as solar pump controllers. Testing is conducted in accordance with IEC 61683:1999, ensuring accurate assessment of inverter efficiency and performance under varying operating conditions. The laboratory also supports research and testing related to islanding prevention mechanisms in utility-interconnected photovoltaic inverters, contributing to grid stability and safety. With its advanced testing infrastructure, the lab serves as a critical platform for innovation in power electronics, supporting the development of reliable, efficient, and grid-compliant renewable energy systems.

2.5 Battery Test & Characterization Laboratory

The Battery Testing and Characterization Laboratory provides a comprehensive platform for the evaluation of secondary energy storage technologies, with a focus on performance assessment, reliability testing, and life cycle analysis. This facility is equipped with advanced instrumentation, including:

Figure 2.7: Power Electronics Laboratory

Figure 2.8: Battery Test & Characterization Laboratory

- Deep-cycle battery testers
- Programmable power supplies
- Data acquisition systems and loggers
- Temperature-controlled water baths
- Specialized hardware and software for automated testing

The lab is capable of supporting rigorous testing across multiple battery chemistries, including Lead-Acid, Nickel-Cadmium, and Lithium-Ion systems. Its infrastructure facilitates a broad range of experimental investigations, supporting both fundamental research and applied development. The facility plays a key role in advancing battery technology for renewable energy integration, particularly in applications involving solar energy storage and off-grid systems.

2.6 Advanced Solar PV System & Lighting Laboratory

The Advanced Solar PV System & Lighting Laboratory serves as a key facility for advancing off-grid solar technologies, with a strong focus on performance evaluation, reliability testing, and product development. The laboratory is equipped to conduct electrical and photometric measurements of solid-state lighting (SSL) products in accordance with relevant national and international standards. This facility supports experimental research aimed at enhancing the efficiency, durability, and environmental adaptability of solar lighting systems and other off-grid solar applications. By enabling rigorous testing under controlled and simulated conditions, the lab contributes to the development of high-performance, energy-efficient lighting solutions tailored for rural and remote settings.

2.7 Solar Water Pumping System Testing Facility

The Solar Water Pumping System Testing Facility is a fully automated, state-of-the-art laboratory dedicated to the advanced performance evaluation of photovoltaic powered water pumping systems. Designed to comply with both national and international standards, the facility enables rigorous testing of systems up to 50 hp.

Equipped with the latest testing and monitoring technologies, the lab supports comprehensive research on a diverse range of pump configurations, including submersible and surface pumps, as well as AC and DC systems. This facility plays a critical role in supporting the development, standardization, and quality assurance of solar water pumping technologies for agricultural and rural water supply applications.

Figure 2.9: Advanced Solar PV system & lighting laboratory

Figure 2.10: Solar Water Pump Test facility for up to 50 hp

2.8 Green Hydrogen Production and Dispensing Station

In alignment with national clean energy goals, Green Hydrogen has been adopted as a dedicated research vertical and identified as a thrust area at NISE and has established a Centre of Excellence on Green Hydrogen. To advance research and development in this domain, NISE has formed a specialized Hydrogen Energy and Fuel Cell Division. This division is focused on R&D activities spanning the production, storage, dispensing, and end-use applications of Green Hydrogen and fuel cell technologies, supporting innovation and technology readiness for future deployment.

NISE hosts India's first solar-powered Green Hydrogen generation and dispensing station, established as a pioneering facility for clean fuel research and demonstration. The system is powered by a dedicated 120 kW_p Solar PV plant, which supplies electricity to two alkaline (KOH-based) electrolysers with a combined hydrogen production capacity of 15 Nm^3/hour. The produced

hydrogen is purified to 99.999%, meeting the specifications required for Fuel Cell Grade Hydrogen. Following purification, the low-pressure hydrogen is compressed to 550 bar and stored in a high-pressure storage tank with a capacity of approximately 60 kg. The station is equipped with an H35 Hydrogen dispenser, capable of refueling hydrogen at 350 bar pressure, with a dispensing rate of 1 kg/min, supporting real-time demonstration of hydrogen-powered mobility and other end-use applications.

2.9 Major equipment available in PV module and system testing lab

Some of the major facilities available for testing and characterization of PV module and systems at NISE are shown in Table 2.1.

Figure 2.11: India's first Solar based Green Hydrogen production cum dispensing station - 350 bar dispensing of fuel cell grade green hydrogen

Table 2.1: List of major equipment available in PV Module and System Testing Laboratory

Sl. No.	Name of the equipment	Purpose
1.	IR camera	For measurement of heat signatures of PV module and BOS
2.	Power Analyzer	To measure the electrical performance of the Solar PV systems
3.	Digital Oscilloscope	To analyze the AC current, voltage & power of the solar PV converters
4.	Anti-Islanding Testing Device	To test the islanding feature of the Solar PV inverters

Sl. No.	Name of the equipment	Purpose
5.	Solar Array Simulator	To simulate the Solar PV plant for the performance assessment of the PV systems
6.	Grid Simulator	To simulate the grid input for the performance of solar PV inverters
7.	Electrical Safety Analyzer	Performance testing of Solar inverters
8.	Battery Simulator	Performance testing of Solar hybrid inverters
9.	Programmable AC / DC Electronic Load	Performance testing of Solar inverters
10.	Magnetic Flow Meter Integral Type	For measurement of the water flow of the solar pumping systems
11.	Gauge Pressure Transmitter	For measurement of the pressure of the solar pumping systems
12.	Temperature sensor	For the measurement of the temperature of PV modules
13.	Digital Insulation tester	For testing the insulation of PV modules
14.	LUX Meter	For measuring the LUX of lighting systems
15.	Integrating Sphere	For measuring the Photometric parameters of lighting systems
16.	PV Performance analyzer (IV tracer unit)	For measuring the outdoor IV characteristics of the PV module
17.	Junction box pull tester	For the measurement of the junction box pull strength of the PV module
18.	Lap shear tester	For the measurement of junction box lap shear strength of the PV module
19.	PV module susceptibility testing machine	For the measurement of the susceptibility strength of the PV module
20.	Module breakage tester	For the measurement of the susceptibility strength of the PV module
21.	Cord Anchorage pull Torsion testing machine	For measuring the Cord Anchorage susceptibility of the PV module
22.	UV chamber	To test the performance of the PV module under UV stress
23.	Environment Chamber	To test the performance of the PV module, inverter under temperature and humidity stress

Sl. No.	Name of the equipment	Purpose
24.	Spire Sun Simulator	For measuring the indoor IV characteristics of PV module
25.	Ignitibility test setup	For measuring the PV module susceptibility under ignitable stress
26.	Spectrometer	For measuring the Spectrum of the Irradiation
27.	EL imager	For measuring the Electroluminescence of the PV module
28.	Impulse voltage tester	For measuring the PV module susceptibility under impulse stress
29.	Deep Life Cycle Battery Tester	For measuring the battery capacity
30.	Solar simulator for Solar cell	I-V testing of solar cells as per IEC 60904-3
31.	Mechanical load tester	For testing PV modules under dynamic and static load stress
32.	Fire test setup	For measuring the PV module susceptibility under Fire stress
33.	Salt mist test facility	To measure the performance of the PV module at various salt stress conditions

CHAPTER 3

Key Research Outcomes

During the year, NISE has taken up Research, Development and Demonstration (RD&D) activities in various solar energy technologies through in-house, externally funded, and collaborative projects. These projects are identified in line with the mandate of NISE and have current relevance in catering to the changing needs of the energy sector. Key research outcomes from various projects undertaken by NISE during the year are detailed below:

3.1 A low-cost synthesis process for the production of monosized particles

To enhance the efficiency of nanostructured solar cells, particularly radial junction solar cells, and improve the stability of perovskite solar cells, the PV R&D Laboratory has developed a low-cost, semi-batch synthesis process based on the Stöber method. This method enables the controlled production of monodisperse silica particles ranging from the nanoscale to microscale. By precisely adjusting key reaction parameters—such as precursor, hydrolyzing agent, and catalyst concentrations—the process allows fine-tuning of particle size, morphology, and distribution, which is critical for optimizing performance in advanced solar cell applications.

The method has successfully produced monodisperse silica particles with diameters from 0.67 µm to 3.2 µm, synthesized by varying only the precursor concentration. These particles exhibit sharp absorption in the ultraviolet region, attributed to the presence of E centers—paramagnetic defects associated with positively charged oxygen vacancies (≡Si•Si≡) and dangling bonds (≡Si•). These optically active defects form during particle growth due to incomplete Si-O-Si network formation. The controlled creation of such defect centers and precise tuning of particle properties enhance light absorption and structural compatibility.

In a similar way, variation in the concentration of the hydrolyzing agent and catalyst produced monosized silica particles of varying sizes. Figure 3.1 shows such controlled size variation achieved by varying the concentration of the precursor (TEOS), the hydrolyzing agent (H_2O), and the catalyst (ammonia).

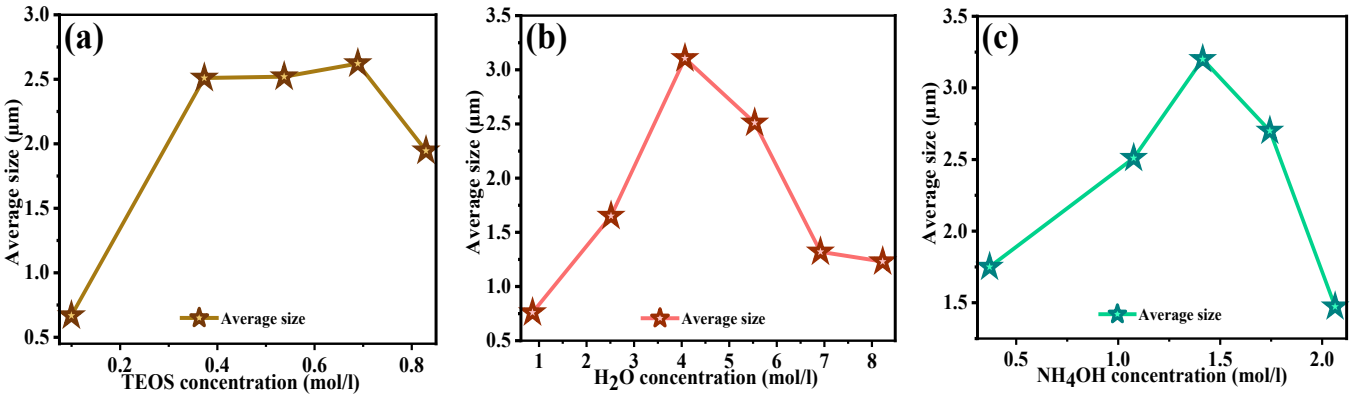

Figure 3.1: Variation of the size of PSPs with the variation of (a) TEOS concentration (0.099 – 0.829 mol/l), (b) H_2O concentration (0.865 – 8.227 mol/l), (c) ammonia concentration (0.369 – 2.064 mol/l) respectively.

The photoluminescence (PL) spectra of the synthesized silica particles exhibit a broad range of emission peaks spanning from the ultraviolet to the red region (280–900 nm), as shown in Figure 3.2. The deconvolution of the PL spectrum shows the presence of several peaks from the UV to the red region. Variations in the concentrations of TEOS, H2O, and ammonia did not show a direct correlation with PL behaviour. However, a clear trend was observed: PL intensity decreased as particle diameter increased. Additionally, a slight blue shift in emission peaks was noted with increasing particle size. The decline in PL intensity with larger particle sizes is attributed to a reduction in the concentration of Oxygen-Deficient Centers (ODCs) on the silica particle surfaces. This interpretation is supported by EDAX analysis, which indicates an increase in oxygen content in larger particles. The higher oxygen content suggests enhanced passivation of surface defects. In particular, defects such as ≡Si–O–S–O–Si≡ (two-fold coordinated silicon) and ≡Si–Si≡ (neutral oxygen vacancy) are increasingly passivated in larger particles. This reduction in active defect sites leads to a diminished PL response, confirming the role of surface ODCs in governing the optical properties of the silica particles.

The observed blue PL peak can be attributed to self-trapped excitons (STEs) undergoing intrinsic radiative decay involving triplet-to-singlet transitions. These excitons are typically generated through high-energy excitation sources such as vacuum UV, UV light, energetic electrons, or multiphoton excitation. Given the wide bandgap of bulk SiO_2 (~11 eV), the use of 200 nm excitation light (corresponding to 12.4 eV from two photons) in the PL study provides sufficient energy to generate free excitons within the silica matrix. As a result, the PL spectra arise from two-photon-induced free exciton generation, followed by energy relaxation through a self-trapping process. This leads to STE-based PL or energy transfer to existing defects and impurities, which then emit their characteristic PL signals. The broad violet-UV emission peak around 410–427 nm, along with a shoulder near 347 nm, is likely due to internal relaxation of localized PL-active oxygen-deficient centers (ODCs), specifically two-fold coordinated silicon species (≡Si–O–Si–O–Si≡). A sharp green PL peak near 494 nm and a shoulder at approximately 534 nm are attributed to hydrogen-related species, such as surface ≡Si–H groups. Emission peaks in the red region are linked to non-bridging oxygen hole centers (NBOHCs), which also contribute to the PL response.

3.2 Fabrication of semi-periodic inverted pyramid array pattern

The monosized silica particles were used as an etching mask to fabricate periodic inverted pyramid structures on the top surface of Si wafers without doing complicated lithographic steps (Figure 3.3 (a)). To achieve such periodic structures first a non-closed pack self-assembled monolayer of silica

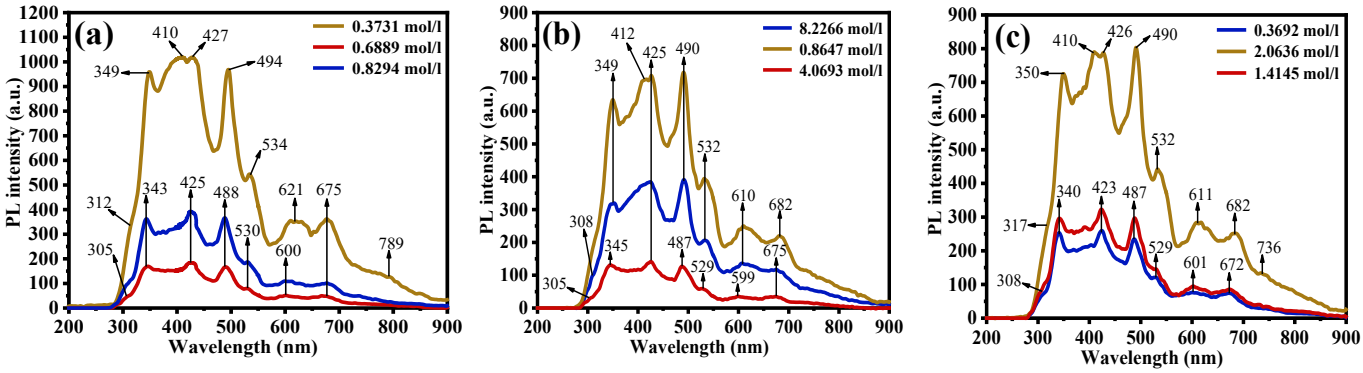

Figure 3.2: PL spectra of the silica particles at different concentrations of reactants: (a) TEOS concentrations, (b) H_2O concentrations, and (c) Ammonia concentrations,

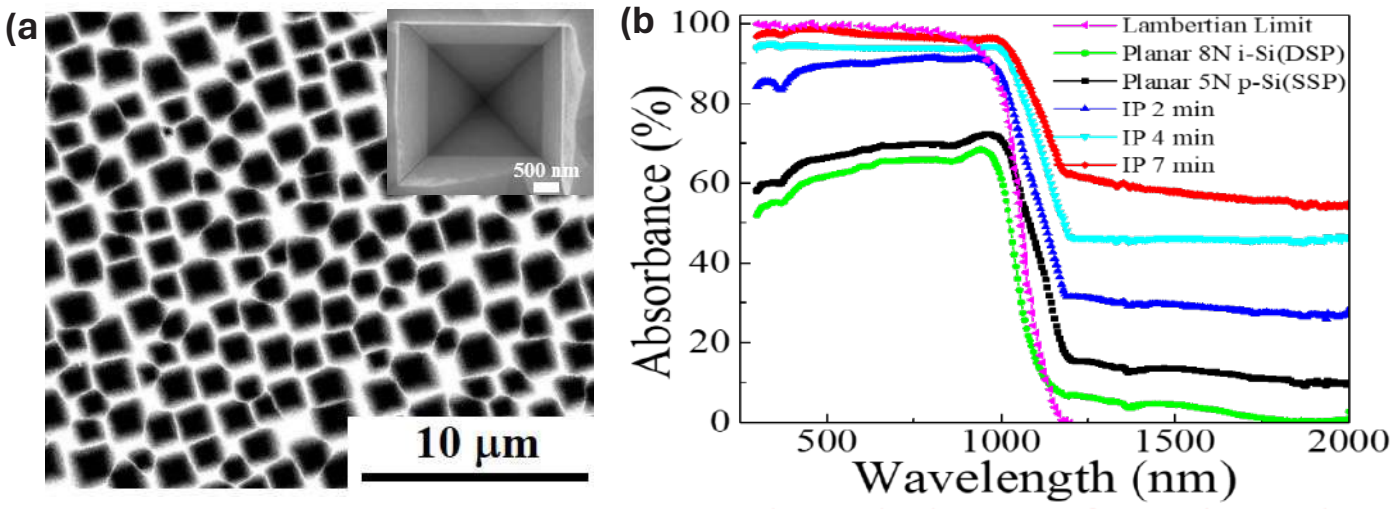

Figure 3.3: (a) Top-View FESEM image of inverted pyramid array pattern. Inset shows higher magnification top view image of one typical inverted pyramid. (b) diffuse reflectance spectra of planar Si and inverted pyramid arrays

particles was formed on the top surface of Si wafers. Then, reactive ion etching was done to introduce a controlled gap between silica particles by reducing their size. Then, a metal coating was done above the non-closed pack pattern. The metal touches the Si surface where Si particles were not there and other places left uncovered by the metal. After this, a lift off process was done to remove the silica particles, so that a metal mesh structure could be formed. Then, a controlled chemical etching was introduced to fabricate a periodic pattern of inverted pyramid structures. By varying the etching time (2–7 min) depth of the inverted pyramids was controlled.

The optical properties of the fabricated silicon inverse pyramid arrays were examined using diffused reflectance spectroscopy across the UV-VIS-NIR spectrum (300–2000 nm). Figure 3.3 (b) presents the diffused reflectance spectra of inverted pyramid arrays processed for different durations (IP-2 min, IP-4 min, and IP-7 min), alongside reference samples: planar 5N p-type silicon (single-side polished) and 8N intrinsic silicon (double-side polished). The planar 8N intrinsic silicon exhibited an average reflectance of 36.7% in the 300–1000 nm range, which increased to approximately 44% in the 1100–2000 nm range. Similarly, planar 5N p-type silicon showed average reflectance values of around 32.5% and 43.3% in the respective spectral ranges.

In contrast, the inverted pyramid arrays demonstrated a substantial reduction in reflectance. For the 300–1000 nm range, the average reflectance values were 10.5%, 5.8%, and 2.9% for 2 min, 4 min, and 7 min of etching, respectively. In the 1100–2000 nm range, these values were 34.9%, 20.3%, and 14.7%, respectively. This significant reduction in reflectance across the entire spectral range (300–2000 nm) confirms the enhanced light-trapping capability of the inverted pyramid structures, making them highly effective for photovoltaic and optoelectronic applications.

3.3 Synthesis of compound perovskite and its characterisation

In a related study, the compound perovskite $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$(PMN-PT) single crystals were synthesized using a solid-state technique, and their structural and optical properties were investigated. X-ray diffraction patterns (Figure 3.4) confirmed a monoclinic structure for compositions with x = 0.1, 0.2, 0.3, and 0.4, showing reflection planes <100>, <110>, <111>, <200>, <210>, and <211>. The presence of prominent peaks indicates a dominant pyrochlore phase. As the $PbTiO_3$ content increases, lattice distortion becomes more significant, leading to noticeable modifications in the monoclinic symmetry of the PMN-PT structure.

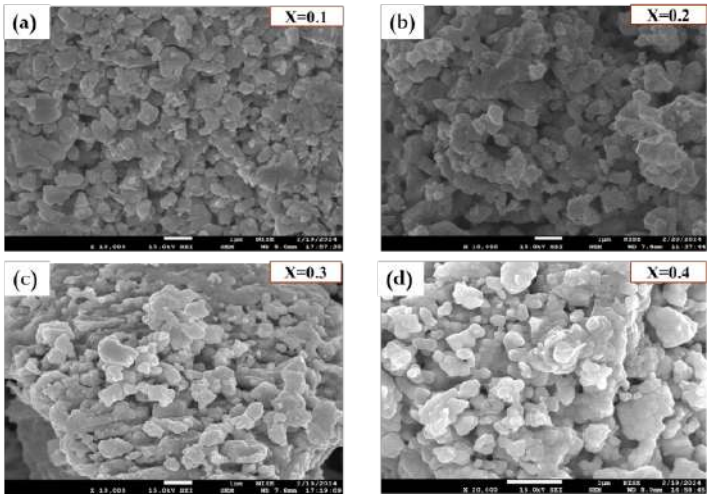

Figure 3.4: Room temperature X- ray diffractograms of $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$

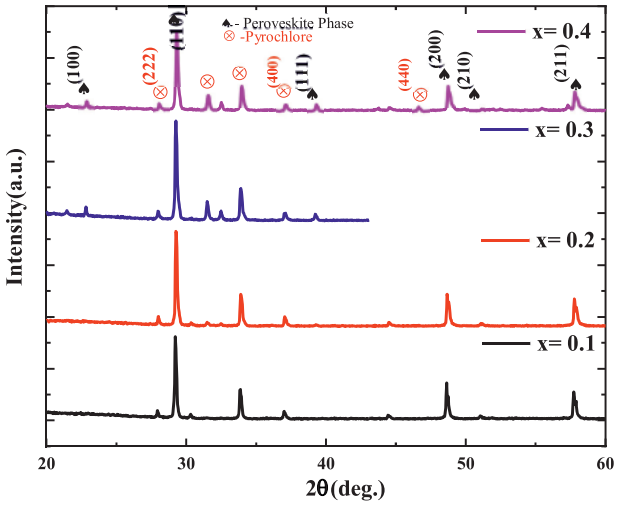

Figure 3.5: FESEM observations for $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$ samples for x=0.1 to 0.4

The morphological analysis of the compound perovskite $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$ reveals a clear variation in mean particle size with changing $PbTiO_3$ concentrations, as shown in Figure 3.5. At x = 0.1, the mean particle size is approximately 0.128 µm, increasing to 0.223 µm at x = 0.2. This growth in particle size is attributed to the incorporation of $PbTiO_3$ into the crystal lattice, which reduces the density of defects and enhances grain boundary mobility. In thin films, such particle growth can improve mechanical and electrical properties by reducing the number of grain boundaries, which often act as scattering centers for charge carriers or stress concentration points.

However, as the $PbTiO_3$ content increases further, the mean particle size decreases to 0.210 µm at x = 0.3 and further to 0.145 µm at x = 0.4. This reduction is likely due to $PbTiO_3$ atoms segregating to the grain boundaries, where they serve as pinning sites. These pinning sites hinder grain boundary movement during sintering, thereby restricting grain growth. As a result, the overall particle size diminishes.

The presence of smaller grains increases the number of grain boundaries, which can negatively impact properties such as dielectric strength and electrical conductivity. Grain boundaries may obstruct charge carrier mobility or act as sites for dielectric breakdown, ultimately affecting the performance of PMN-PT-based devices.

Figure 3.6 represents the FTIR spectra of $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$ for x = 0.1 to 0.4, highlighting key vibrational modes associated with specific bonds in the material. The peak at 508 cm^{-1} is attributed to the flexural vibrations of Ti–O bonds within the TiO_6 octahedra, characteristic of the perovskite structure. The 598 cm^{-1} peak corresponds to the stretching vibrations of Nb–O bonds in the NbO_6 octahedra, indicating the presence of niobium in the lattice. A distinct peak at 859 cm^{-1} is linked to complex vibrational modes involving Pb–O bonds and possible interactions within the lead oxide environment. These FTIR features confirm the structural integrity and multi-element bonding nature of the PMN-PT compositions.

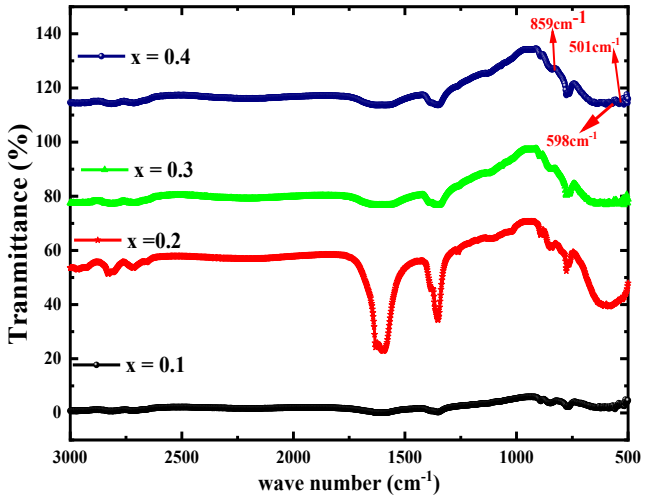

Figure 3.6: FTIR spectra of $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$

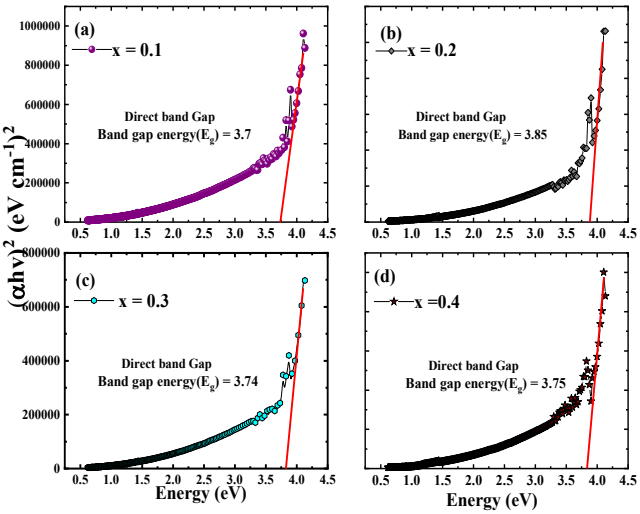

Figure 3.7: (a)-(d) Tauc plot for the $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$

The optical band gap values of $\{Pb(Mg_{1/3}Nb_{2/3})O_3\}_{1-x}\{PbTiO_3\}_x$ thin films (x = 0.1, 0.2, 0.3, 0.4) were determined using the Tauc relation by plotting $(\alpha hu)^2$ versus photon energy, where α is the absorption coefficient determined from UV-Vis-NIR absorption spectra. The estimated band gaps were 3.70 eV, 3.85 eV, 3.74 eV, and 3.75 eV, respectively, as shown in Figure 3.7. These values were obtained by extrapolating the linear region of the Tauc plots.

3.4 Optimization of stabilization procedure of reference solar cell

A study has been done on different stabilization procedure of solar cell to be used as reference solar cell. We compared stabilization of solar cell with dark annealing, dark current biasing, and operating the solar cell at maximum power point (MPP) for multiple periodic durations under illumination. It has been observed that the typical time for stabilization of a solar cell in terms of power is more than 1000 hours of light soaking or dark current bias with a power loss of 0.37% and 0.36% for the respective methods. However, the stabilization procedure may also depend on the technology of the reference solar cell. All stabilization methods demonstrated sufficient potential for stabilizing c-Si solar devices for standardized power measurement. Figure 3.8 shows the dark I-V of the solar cell after applying different stresses.

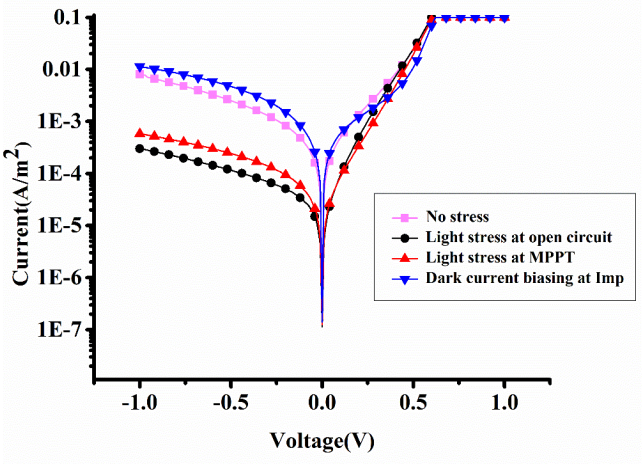

Figure 3.8: Dark I-V of solar cell with different stabilization procedure

3.5 Estimation & potential assessment of PV module waste in India

The rapid expansion of solar energy in India presents an emerging challenge regarding the management of photovoltaic module waste. As large-scale solar installations in India are about to reach the end of their 25–30-year lifespan, a significant volume of waste, including panels, mounting structures, and electronic components, is expected. This study aims to estimate the projected location-specific PV waste generation in India through 2047 by analyzing historical installation data from 2016–2022 and incorporating assumptions reported in the literature. A multi-faceted approach is employed, incorporating historical data analysis, growth trajectory modelling, and end-of-life projections based on panel degradation patterns. A solar panel weighing 0.672 kg/W_p was analyzed by removing each component and calculating its composition. The panel consists of 51.6% glass, 20.2% aluminum frames, 14.9% solar cells, 6.9% metal connections, 3.6% EVA & back sheet, and 2.1% junction boxes in terms of kg/W_p. The study provides state-wise projections of PV waste considering the component-wise weight/W_p, identifying Rajasthan, Karnataka, and Tamil Nadu as the largest contributors. By 2047, India is projected to generate approximately a cumulative total of 288 million tons of PV waste considering PV modules only. This highlights the

urgent need for sustainable waste management and recycling solutions. This study's waste projection is based on assumptions considering components for glass to back sheet solar panels, panel failures, transport damage, and installation defects, which may not fully reflect real-world variations. Future research should incorporate real-time performance data, technology-specific analysis, and location-based projections for more accurate assessments. This research will help serve as a strategic guide for policymakers, industry stakeholders, and waste management authorities by informing capacity planning, policy development, and infrastructure investments. Figure 3.9 shows the cumulative component-wise waste generation in the top nine states of India by 2047.

3.6 Improved Performance Assessment of Bifacial PV Modules Using Modified Equivalent Irradiance Method

Assessing bifacial PV module performance is challenging due to variability in albedo and the lack of standardized performance metrics. Field-level analysis becomes further challenging when assessing the performance of bifacial PV modules. Currently, IEC TS 60904-1-2:2024 provides two standardized indoor measurement methods: dual-side illumination and the equivalent irradiance (GE) method. Through this research work, it has been demonstrated to what extent actual power deviates from the estimated power using the GE method as per IEC 60904-1-2. In this study, a bifacial module was measured under indoor conditions as per IEC 60904-1-2 to estimate the power and compared with the performance under outdoor conditions with various front and rear irradiance simultaneously. It was found that there is a deviation of around 60% at low irradiance and around 15% at higher levels (Figure 3.10). To address this issue and achieve accurate measurements, the formula was modified to account for various environmental factors, including spectral variations, the ratio of direct to diffuse irradiance, temperature fluctuations, and the Angle of Incidence (AoI). A direct and diffuse corrected equivalent irradiance calculation, based on IEC 61853-3, has been employed to overcome these challenges. This approach incorporates the influence of these critical parameters, leading to a substantial reduction in deviations over a wide range of irradiance levels, from low to high. The GE, Modified method enables a more precise evaluation of bifacial PV module performance under real-world outdoor conditions by aligning it more closely with indoor measurement results. This advancement is particularly valuable for the PV community, as it bridges the gap between indoor and outdoor performance assessments, providing a reliable framework for assessing the

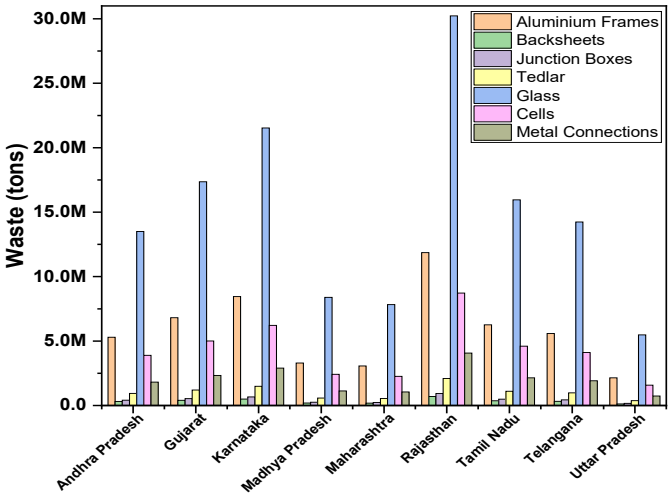

Figure 3.9: Cumulative component-wise waste generation in the top nine states of India by 2047

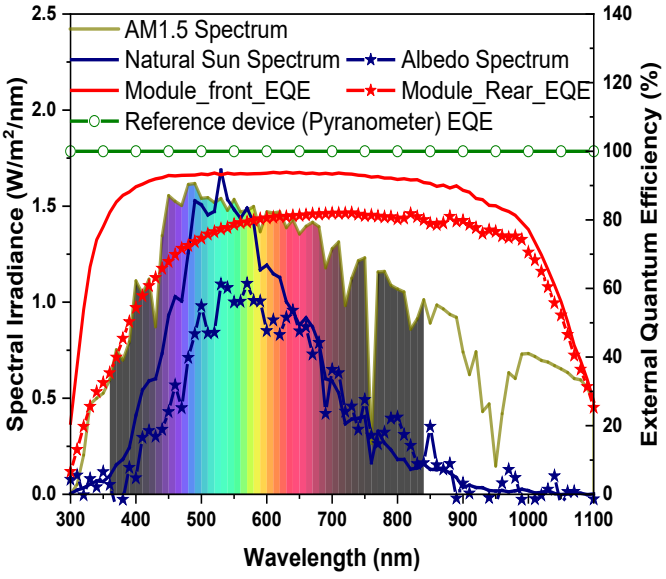

Figure 3.10: Spectral mismatch calculation

performance of bifacial PV modules. By capturing the complexities of outdoor operation, the GE, Modified method ensures robust performance estimation, aiding in the widespread adoption and integration of bifacial PV modules in real-world solar energy applications (Figure 3.11).

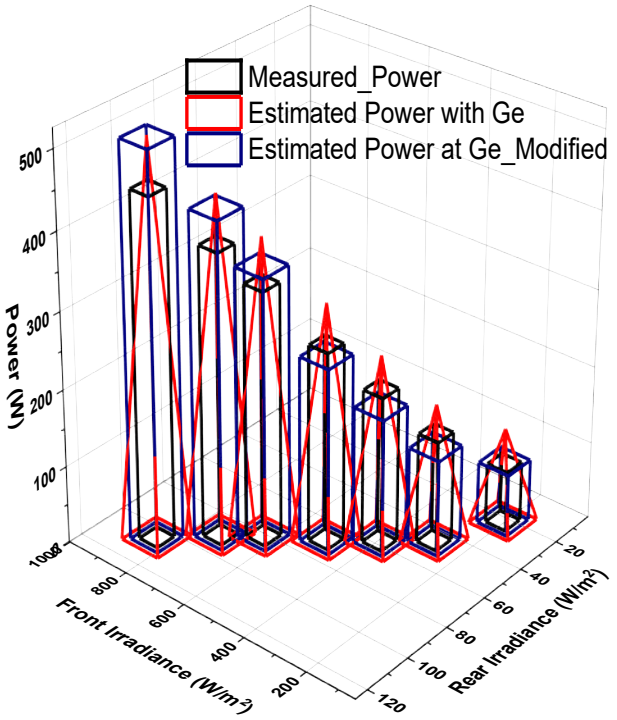

Figure 3.11: Deviation in measured Power with respect to GE and GE, Modified method

3.7 Design and Simulation of Agri-Voltaic Power Plant for Different Agro-Climatic Zones of India

NISE conducted a study on the design and simulation of agrivoltaic power plants for India's fifteen agro-climatic zones. For each zone, PV power plants were designed with different orientations, and simulations were conducted to determine the potential energy output and the size of the installations for 1 acre of land. Additionally, the Levelized Cost of Electricity (LCOE) for each zone was also calculated. This helps in evaluating the cost-effectiveness of these systems in different regions. The results provide valuable insights into how agrivoltaic systems can be optimized for specific regions in India with generation (kWh/kW_p/yr) and the approximate size for each acre of land availability. Simulation results show that a maximum energy of approximately 6,13,936 kWh/yr can be produced in the Western Dry Region using bifacial modules, which refers to an energy production of 327.04 kWh/acre of land. The minimum energy of approximately 2,64,364 kWh/yr can be produced in the Eastern Himalayan Region, which refers to an energy production of 193 kWh/acre of land. Figure 3.12 shows the energy yield and optimum tilt angle for

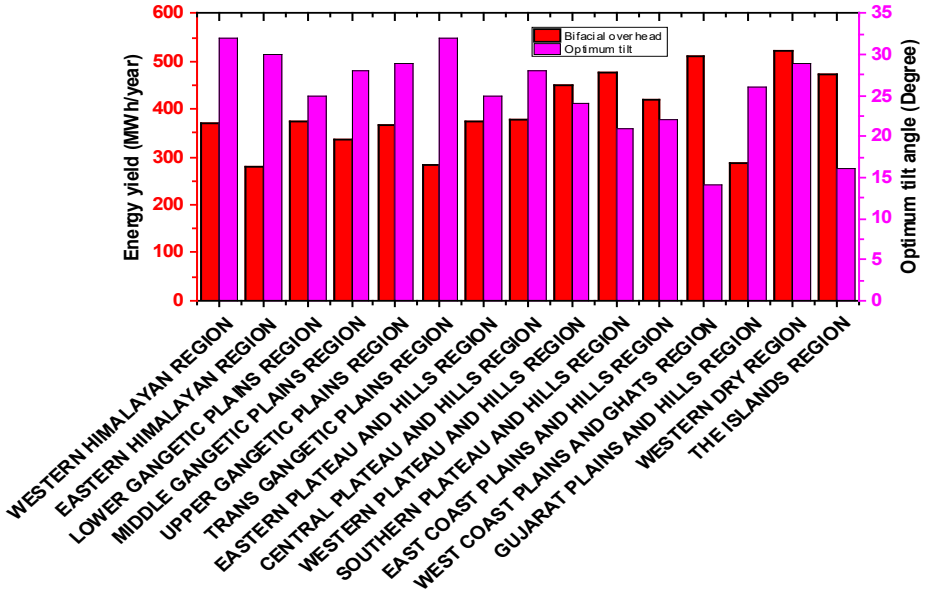

Figure 3.12: Energy yield and optimum tilt angle for overhead power plant

overhead AgriPV power plants for different agro-climatic zones.

3.8 Centre of Excellence (CoE) for Agri-PV

In FY 2024-25, the Centre of Excellence (CoE) for AgriPV at NISE undertook a series of impactful activities to advance the adoption and understanding of AgriPV systems in India. Key initiatives included the development of a dedicated AgriPV webpage and the creation of a two-page informative brochure to raise awareness among stakeholders. The CoE conducted an impact assessment of crops under AgriPV installations and developed a comprehensive crop suitability matrix. A set of India-specific guidelines for AgriPV systems was prepared to support standardized implementation. Field visits were carried out across six operational AgriPV sites in Maharashtra, Gujarat, Madhya Pradesh, and Delhi to document best practices and challenges of AgriPV systems under Indian conditions. The CoE organized five national webinars covering diverse themes, from technical design to policy frameworks, with participation from industry experts, developers, and farmers. Extensive farmer engagement was facilitated through PM-KUSUM awareness workshops held at multiple Krishi Vigyan Kendras (KVKs) across India, as well as through participation in the Krishi Udyog Samagam 2025 in Indore. Stakeholder consultations were held with key industry players and policymakers, resulting in a draft policy recommendation report, including a comparative analysis of AgriPV policies in various countries to guide national policy formulation.

3.9 Framework for re-use of Secondary life PV modules in distributed PV applications:

Re-use of secondary-life PV modules can play an important role in promoting a more secure, sustainable, and resource-efficient solar industry. A comprehensive framework has been developed for the re-use of secondary-life PV modules in distributed PV applications. This approach focuses on the effective identification, characterization, and repair (if required) of fielded PV modules. Implementing such a re-use strategy can significantly reduce the volume of end-of-life (EoL) modules and ease pressure on solar supply chains. However, user acceptance and financial feasibility are critical to the success of this initiative. Business case studies suggest that, for re-use to be attractive to end users, the modules should have a remaining service life of at least 10 years. To support widespread adoption, there is a need for advanced, cost-effective diagnostic and measurement tools that can reliably assess module health and performance, ensuring the economic viability of secondary use. Figure 3.13 shows the different parameters considered for estimating the cost of PV module for secondary use.

3.10 Floating Solar PV Potential Assessment

Floating Solar Photovoltaic (FSPV) systems offer a practical solution by utilising water bodies for solar energy generation, thereby reducing the stress on land resources. To address these challenges and support India's renewable energy goals, the NISE has developed a robust methodology for assessing and quantifying the potential of floating solar PV installations across the country.

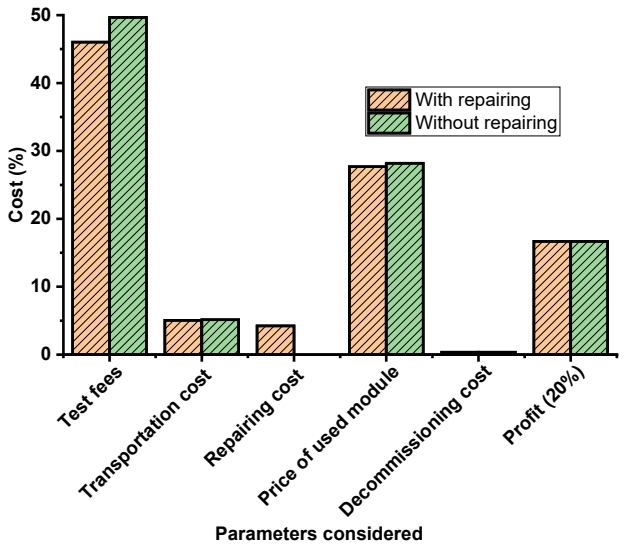

Figure 3.13: Distribution of different parameters used for cost estimation of PV module for secondary use

NISE adopts a data-driven analytical approach, leveraging high-resolution GeoBase data to ensure precision and reliability. The assessment included an in-depth analysis of various parameters, including water bodies, water availability (Seasonality) and bathymetry (Water depth) as well as the parameters used in ground-mounted solar potential assessment, such as road network, transmission substations and solar irradiance data to ensure optimal site selection, efficiency, and sustainability to deliver a high-resolution assessment of feasible sites. The methodology considered for the floating solar potential of India is provided in Figure 3.14. The procedure followed is explained using a case study to overcome the visibility of these features on the map.

Case Study of Floating Solar Water Body Feasible Area Estimation

Due to the limited visibility of hydro lakes on the Indian map, the methodology for evaluating the floating solar potential has been demonstrated using the Hirakud Reservoir as a representative case study. A systematic geospatial analysis was undertaken to identify feasible areas for photovoltaic installation. The assessment commenced with the selection of the Hirakud Reservoir from hydrological datasets, delineating its spatial extent to serve as the analytical foundation, as illustrated in Figure 3.15. Subsequently, a temporal analysis of water availability was conducted by processing 12 months of seasonality data derived from the Global Surface Water (GSW) dataset, ensuring year-round water presence within the reservoir, as depicted in Figure 3.16.

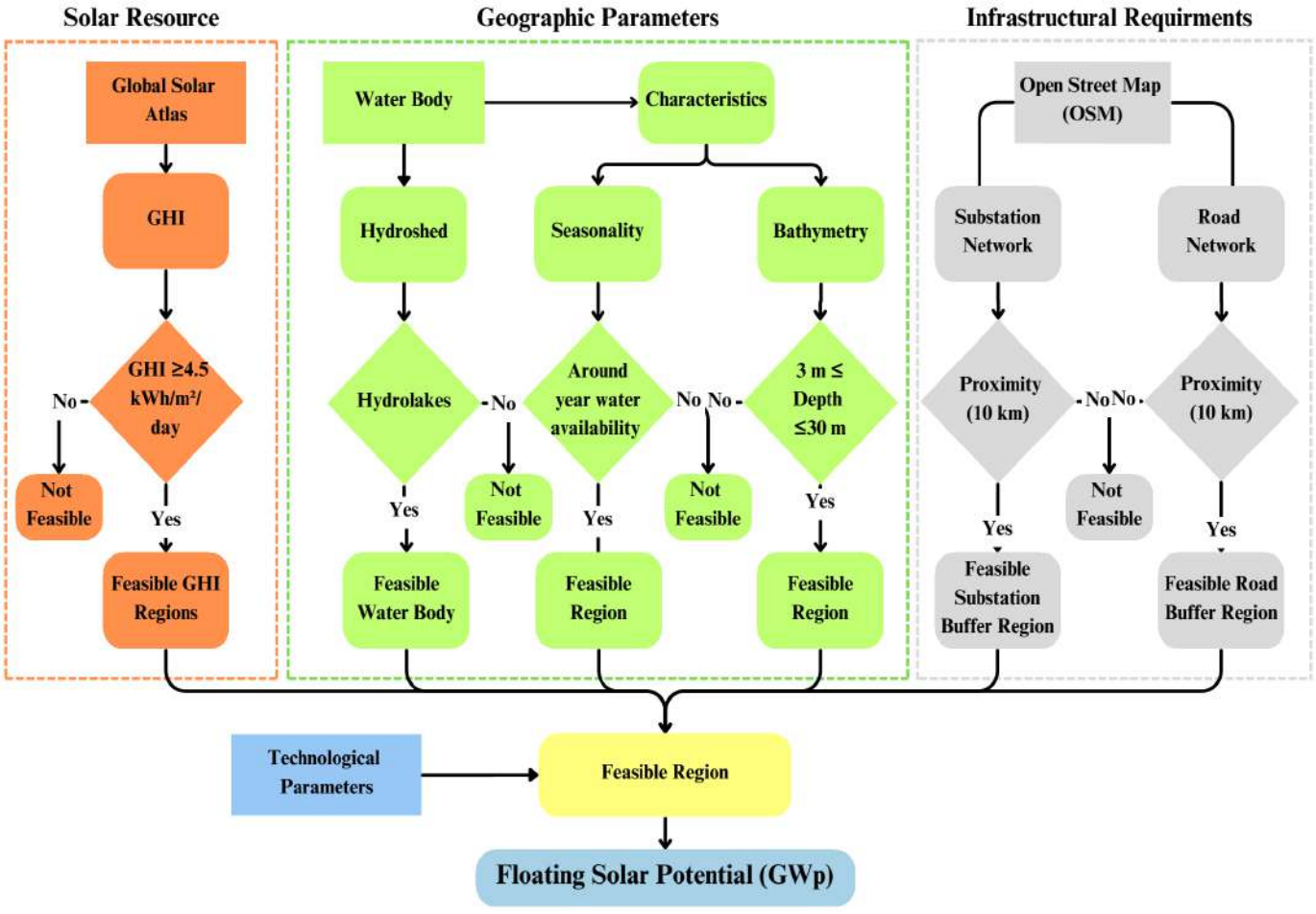

Figure 3.14: Flowchart of the methodology used for the floating solar potential assessment

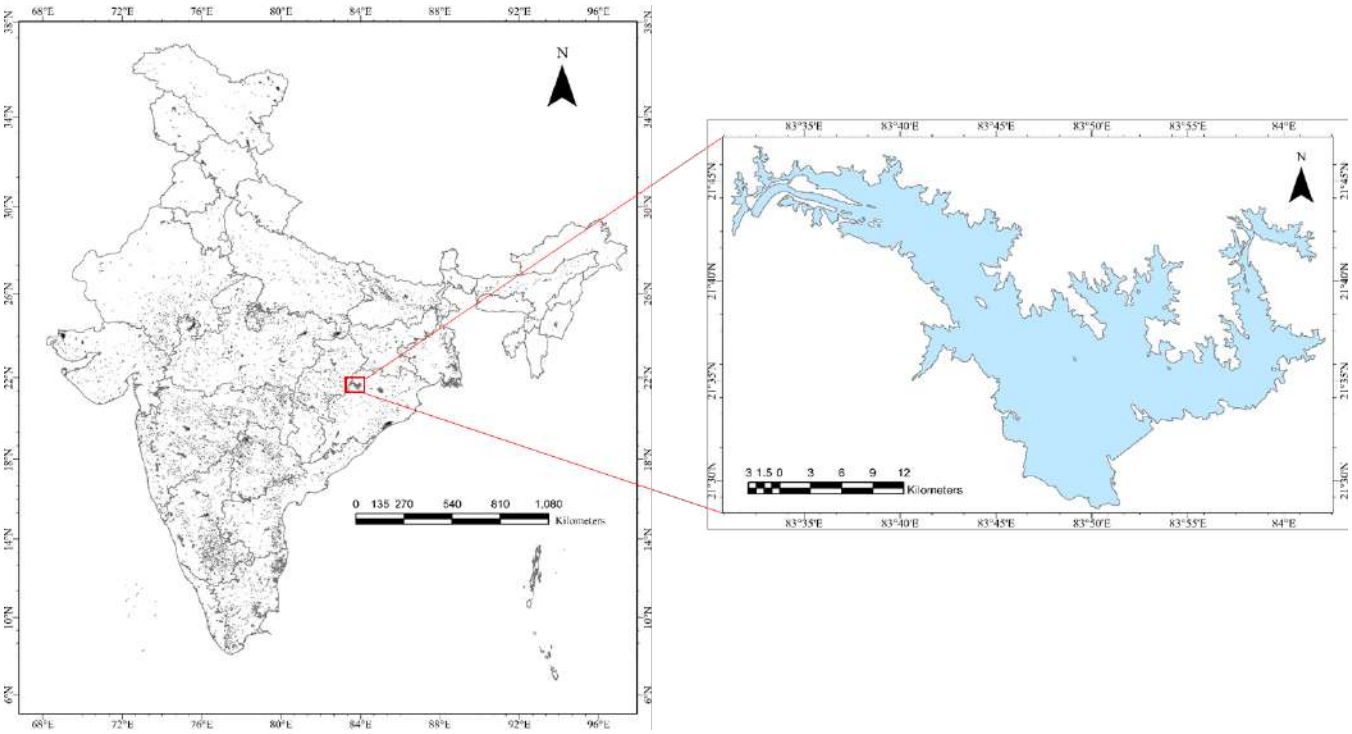

Figure 3.15: Hirakud Reservoir from the hydrological datasets

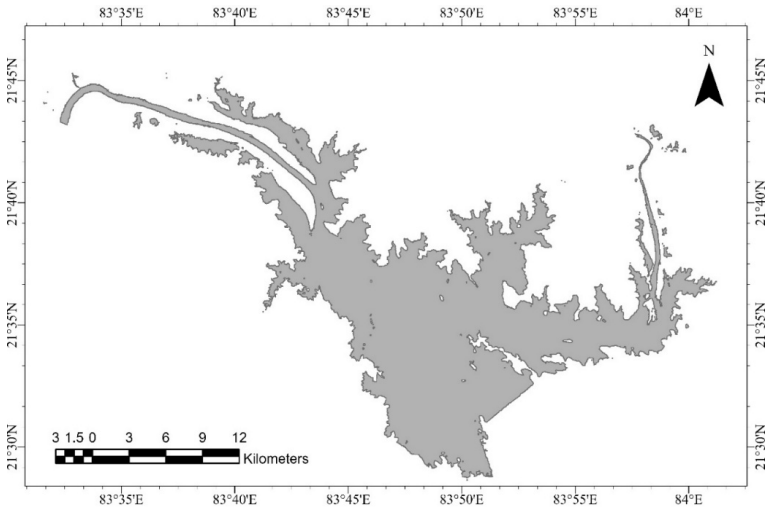

Figure 3.16: The graphical presentation of seasonality of Hirakud reservoir sourced from Global Surface Water dataset

Following this hydrological assessment, bathymetric data obtained from the GLOBathy dataset were integrated to determine water depths ranging from 3 to 30 metres, which are considered optimal for the deployment of floating solar systems, as shown in Figure 3.17. Areas with depths shallower than 3 metres were excluded to mitigate risks related to structural stability, while regions exceeding 30 metres were disregarded due to complexities associated with anchoring and cost implications.

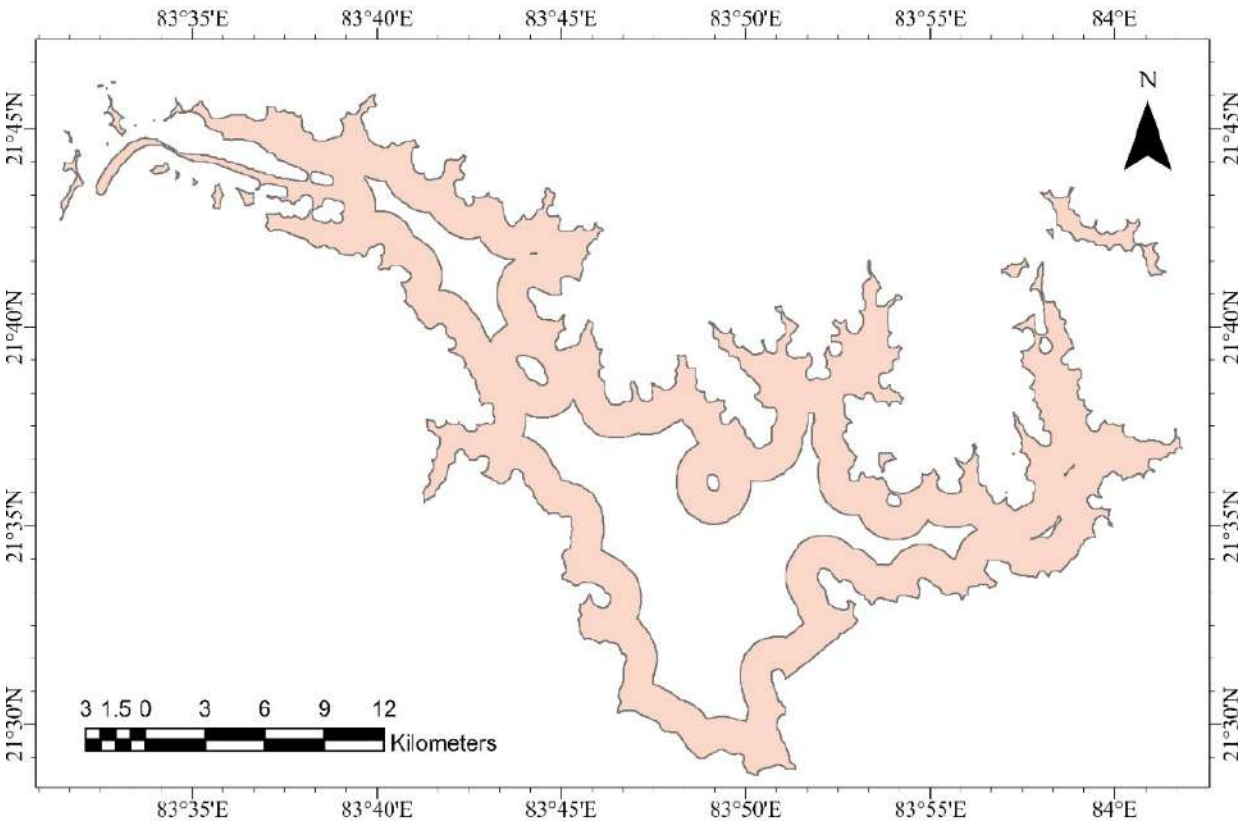

Figure 3.17: The graphical presentation of bathymetry of Hirakud reservoir sourced from GLOBathy

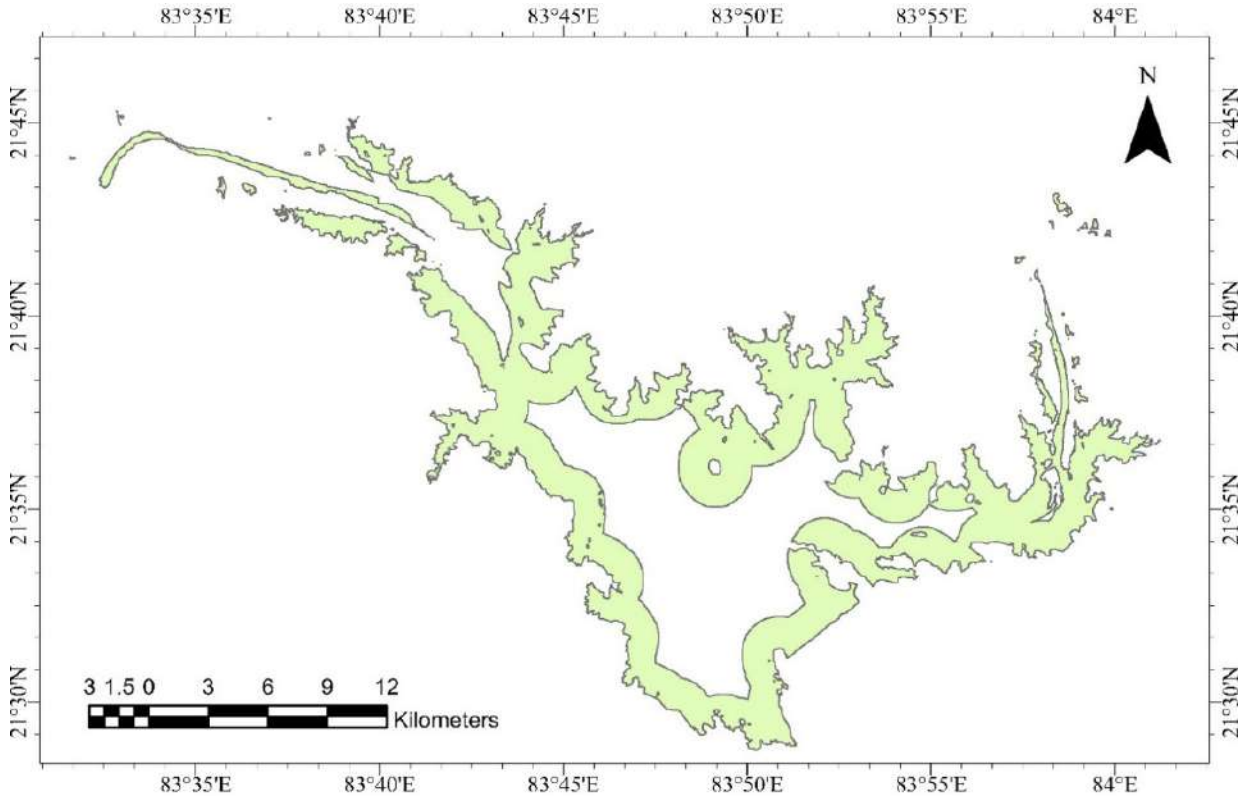

Figure 3.18: Feasible sites of Hirakud for Floating PV installation

Combining the given parameters encompassing Hydrolake, Seasonality, and Bathymetry the feasible sites for the floating solar are identified and are shown in Figure 3.18. This multi-criteria assessment ensured the selection of areas that are technically feasible, economically viable, and environmentally sustainable for floating PV installations. The analysis of the Hirakud Reservoir revealed that out of the total water surface area of 499.48 km^2 approximately 204.53 km^2 met the defined criteria for year-round water availability and suitable depth (3 to 30 metres).

3.11 Solar cooking with Energy Storage System

To promote sustainable and clean energy technologies, an Indoor Solar Cooking System integrated with Thermal Energy Storage has been developed to enable reliable, round-the-clock cooking. The system harnesses solar energy during daylight hours for direct cooking applications, while simultaneously storing excess thermal energy in a dedicated storage unit. This stored heat can then be utilized during off-peak hours or in the absence of sunlight, ensuring uninterrupted cooking. The technology is particularly suited for domestic use in areas with inconsistent energy supply and aims to reduce dependence on conventional cooking fuels.

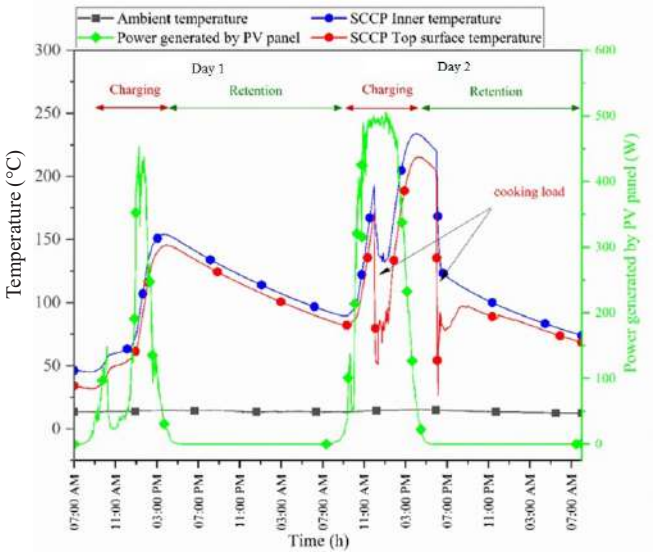

Figure 3.19: Cooking performed in the Indoor Solar Cooking System

The system has successfully completed the design and laboratory testing phase, and pilot deployments are being planned to evaluate field performance and user acceptance. Figure 3.19 represents the charging and retention periods along with cooking load represented by dip in temperature of the solar cooker.

3.12 Solar Cabin with Thermal Energy Storage

The division is actively engaged in the development of an innovative solar space heating system designed for residential and institutional use in the cold climatic zones of the Himalayan region. The system uses solar photovoltaic panels to generate electricity, which is converted into thermal energy and stored in a cost-effective, sand-based thermal battery. This stored heat is used to maintain indoor warmth during night-time and low-sunlight conditions.

To enhance performance and adaptability, the division is also working on multiple configurations of the sand battery. The system offers a zero-emission, sustainable alternative to conventional heating methods, with prototype development underway and field demonstrations planned.

Figure 3.20 represents the variation of solar intensity and temperature of thermal energy storage material, cabin, and ambient in a day.

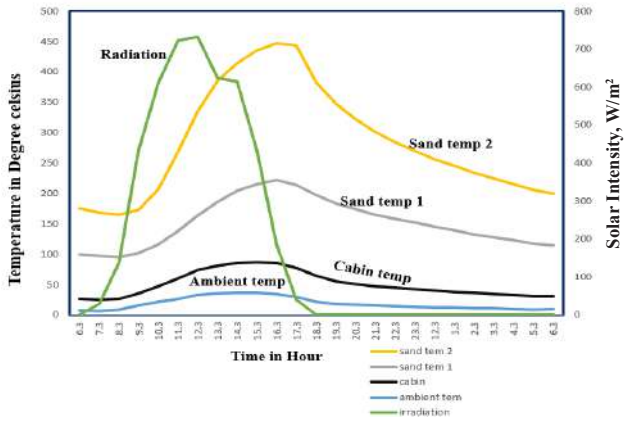

Figure 3.20: Performance Graph of various temperature and radiation during testing

3.13 Instant Solar Geyser

The Solar Thermal Division has developed a novel instant water geyser integrated thermal energy storage to enable consistent hot water supply using solar energy. Unlike conventional geysers, which take some time to heat water, this system provides hot water instantly as and when required.

By incorporating thermal energy storage into the geyser, the system addresses the intermittent nature of solar energy. The system uses solar PV panels for electricity generation which is then stored in the TES using centrally placed heating element housed within the well-insulated metallic tank. The thermal energy from the TES is transferred to the input cold water (Figure 3.21).

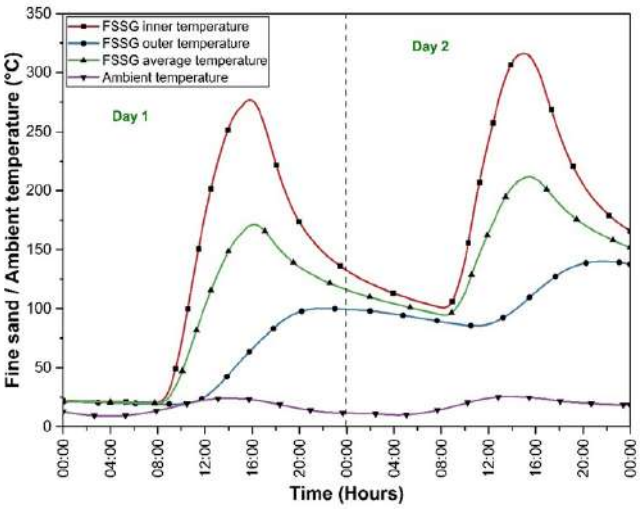

Figure 3.21: Temperature variation of fine sand and ambient during the charging operation.

This configuration, with TES as the heat transfer and storage medium, ensures efficient energy utilization and a sustainable solution for instant hot water supply, even when solar energy is not directly available.

3.14 Solar-Powered Micro-Irrigation: Field Study and Outcomes

To promote sustainable water management and climate-resilient agriculture, NISE conducted a study to assess the feasibility of solar-powered micro-irrigation systems utilizing surface water sources such as shallow ponds and farm tanks. A solar-powered water distribution unit was integrated with a drip irrigation network. Water was drawn from a water tank and system operated twice daily for 43 minutes, resulting in 86 minutes of irrigation per day.

A study was conducted to evaluate the feasibility and functional reliability of a portable, solar-powered micro-irrigation system using surface water sources such as shallow ponds or farm tanks. System operated effectively with a single solar panel, delivering consistent water output for drip irrigation under real-world field conditions. This validates the potential of the setup as a low-cost, mobile solution for small-scale farmers, especially in areas with limited access to groundwater. While crop yield was recorded, the primary objective was to assess whether the technology could function efficiently and support irrigation needs. The results affirm that such systems can significantly reduce water consumption and offer a sustainable alternative for decentralized irrigation.

3.15 Reliability & Performance Evaluation of Solar Water Pumping System

Solar water pumps are deployed in varied geographic and climatic zones across India and hence these systems must function reliably under diverse water qualities, including saline, muddy, and high-particulate content conditions. NISE has developed a state-of-the-art test R&D facility to evaluate the reliability, durability, and performance of AC/DC solar water pumping systems ranging from 1 hp to 10 hp and capable of handling total dynamic head up to 200 metres (Figure 3.22). The test facility includes two dedicated test slots (2” and 3”) accommodating muddy and saline water with a pH range of 7.5 to 8.4 and equipped with advanced instruments to assess key performance indicators such as flow rate, pressure head, input power, temperature profiles, and mechanical wear, enabling a thorough analysis of system durability and reliability. This initiative is crucial for benchmarking product quality and ensuring suitability for diverse Indian field conditions by ensuring:

Figure 3.22: Reliability & Performance Evaluation of Solar Water Pumping System Reliability test set up at NISE

- Standardized performance verification under controlled but realistic conditions.
- Long-term reliability data for components and different materials.
- Improved decision-making for technology selection and policy formulation.
- Evaluation of material performance, especially for pump wetted parts made from Cast Iron (CI) and Stainless Steel (SS).

3.16 R&D Outcomes

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1. A Solar Dryer (Indian Patent Application No. 202411060884)

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CHAPTER 4

Industrial Research and Technical Consultancy

The Industrial Research and Technical Consultancy Division at NISE facilitates the translation of scientific knowledge and technological interventions into practical solutions for industry, government bodies, and other stakeholders. As a dedicated knowledge hub, NISE is committed to fostering the widespread adoption of high-quality solar technologies through its tailored technical consultancy services. The expert team supports solar industry professionals, manufacturers, developers, and technology users in various technical aspects, ensuring the best outcomes.

The following are the key technical services offered by NISE, not limited to these:

- **Feasibility Studies:** Technical studies analysing the implementation of Solar PV, Solar thermal or Green Hydrogen projects to evaluate the project viability and success.
- **Performance Assessment & Troubleshooting:** Health check-up of existing solar PV power plants (with and without storage), including field level testing, measurements, calibrations and due diligence studies and to optimize solar system performance considering the long-term generation and reliability of the PV plant.
- **Technical Audits:** Technical audit and quality control of solar PV power plants including the checks on the installation and commissioning, technical audits of manufacturing facilities (Solar cell, PV module, batteries, electrolyzes).
- **Industrial Research Collaborations:** Research and developmental support to PV module and cell manufacturers in new and advance product development. Partner for research collaborations to solve industrial challenges, and also to address the challenges which have social impact.
- **Verification and Vetting:** NISE is also involved in reviewing and vetting the technical submissions involved in the implementation of the solar projects, ensuring the required compliances as per the applicable standards.

In the year 2024-25, NISE has carried out field level inspection and testing for various solar projects. A total of 12 number of technical consultancy assignments were taken up during the year 2024-25. Technical audit was carried out on solar PV power plants installed on Government buildings at Trivandrum Kerala. In 2024-25, NISE team carried out a performance assessment factory acceptance test of a BESS system.

The key projects undertaken in the FY 2024-25 are summarised briefly, below:

i. Development of green and climate resilient infrastructure through solarization in health care facilities (HCFs) in India

NISE is partnering with UNICEF (India) for implementation of solar based solutions for selected PHFs in India. The major specific objectives of this partnership include,

a. Carrying out sample-based energy needs assessment of public health care facilities,

b. Providing technical assistance (to State Government/NCDC) for implementation of solarization of select public health care facilities using the system designed by NISE. Following are some of the major achievements:

- Development of Rationalized design for solarization of various types of health care facilities (SHCs, PHCs, CHCs, SDHs,

DHs and Medical Colleges) in UP, Kerala and Gujarat.

- Standardizing the design requirements and technical specifications to facilitate smooth implementation of the programme.
- Solarization of 70 health care facilities have been initiated, in Uttar Pradesh, during this period.
- Development of training content related to solarization and base line energy assessment.
- A mobile application was developed for health officials to cater training requirements in O&M aspects of Solar PV power plants.

ii. Implementation of qualitative requirements and technical acceptance for setting up of PV module manufacturing facility in India under PLI scheme.

Under this project, NISE extends technical support to Solar Energy Corporation of India (SECI) for verification and validating the qualitative and quantitative requirements of setting up of solar PV cell and PV module manufacturing facility in India under the PLI (Tranche II) scheme.

iii. Technical Support in Solar PV parks:

NISE has been providing technical support to Rewa Ultra Mega Solar Park Limited (RUMSL) for technical audit of the large-scale ground mount solar PV power plants (approx. 1700 MW) during its commissioning stage. This activity includes review of the technical documents submitted by various solar PV developers, and verifications at the site during commissioning of PV plant.

Figure 4.2: Field Testing of Rooftop Solar PV power plant in Trivandrum

Figure 4.1: Technical audit of solar PV Park

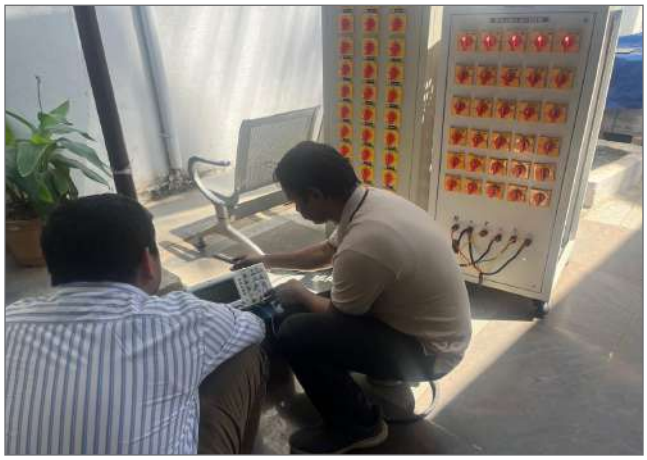

Figure 4.3: Factory Acceptance Test of 150 kWh BESS system at Bengaluru

CHAPTER 5

Testing and Standardization Activities

5.1 Photovoltaic Testing and Calibration Facility

Testing of solar components and systems is essential for ensuring performance and safety by preventing electrical hazards such as shocks, short circuits, and fires. It verifies system efficiency and evaluates reliability under various environmental conditions, including extreme temperatures, humidity, and dust. Compliance testing ensures adherence to national and international safety standards, which is critical for market acceptance and legal approval. By identifying potential points of failure, testing enhances system robustness and design, ensuring consistent output and reliable performance. This process builds consumer confidence by validating product claims and supporting warranties, ultimately minimizing the risk of costly failures and maintenance issues.

The Photovoltaic Testing and Calibration Facility at NISE is a laboratory dedicated to the testing of solar PV modules and system components in accordance with both national and international standards. Additionally, NISE is engaged in the standardization of various solar energy-related activities. Calibration of pyranometers, reference PV modules, and solar simulators is performed to enhance quality control in the country.

The state-of-the-art facility is equipped with world-class infrastructure, competent human resources, and high-end test equipment and instruments. Both in-house and on-site facilities are provided as per requirements, offering flexibility for overall quality control requirements of MNRE and product development. In addition to routine testing, experimental and theoretical research projects are also undertaken to promote the development of quality solar-allied products by the industry.

Services:

- Qualification testing as per National (BIS), International standards (IEC/ EN/ ANSI/ LM), MNRE and In-house developed specifications
- Quality benchmarking of Solar PV products
- Environmental, Reliability, Ingress protection and Safety tests
- Product developmental/ customised/ user-defined testing
- Traceability measurement
- Pre and post Compliance Testing
- Performance testing
- Root-cause analysis

Product categories:

- Radiation measurement devices
- PV cells and module
- Power Converters for use in Photovoltaic power systems
- Batteries
- Luminaries
- Solar water pumping systems
- Solar On-grid/ off-grid systems

5.2 Solar Module Testing Facility

The performance and reliability testing of PV modules is crucial for several reasons:

- **Verification of nameplate and energy rating:** Testing PV modules at STC verifies their nameplate specifications and efficiency, helps estimate energy yield across various climates, and guides the selection of suitable

module technology. The module test lab offers testing of PV modules of various technologies.

- **Long-term reliability testing:** PV module reliability tests simulate harsh environmental factors like UV radiation, temperature, humidity, and mechanical stress with accelerated conditions to assess durability, and this test lab has the capability to simulate these environmental stresses.
- **Safety assurance:** PV modules must operate safely without electrical hazards or physical risks, requiring checks for short circuits, ground faults, and structural integrity, all of which this test lab can perform according to various standards.
- **Customer confidence & warranty support:** By conducting performance and reliability tests while maintaining traceability per NABL/ BIS requirements, this lab instils customer confidence in PV modules for power plants, measures degradation rates for warranty assessments, and potentially facilitates warranty benefits from manufacturers in cases of significant degradation
- **Compliance as per QCO of MNRE and BIS:** This lab also has the capability of doing tests of PV modules as per the quality control order of MNRE/BIS for legal acceptance.

NISE has a PV module testing and calibration laboratory and maintains it as per ISO 17025:2017. The facility is also recognised by the Bureau of Indian Standards (BIS) for PV Module Testing as a Type 2 category facility. At present, the lab is offering testing for the following test standards:

Table 5.1: List of test standards followed by Module Test Laboratory at NISE

Standard No.	Details
IEC 61215-1-1: 2021/ IS 14286-1-1: 2023	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-1: Special requirements for testing of crystalline silicon photovoltaic (PV) modules
IEC 61215-1-2: 2021/ IS 14286-1-2: 2023	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-2: Special requirements for testing of thin-film Cadmium Telluride (CdTe) based photovoltaic (PV) modules
IEC 61215-1-3: 2021/ IS 14286-1-3: 2023	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-3: Special requirements for testing of thin-film amorphous silicon based photovoltaic (PV) modules
IEC 61215-1-4: 2021/ IS 14286-1-4: 2023	Terrestrial photovoltaic (PV) modules - Design qualification and type approval - Part 1-4: Special requirements for testing of thin-film $Cu(In,Ga)(S,Se)_2$ based photovoltaic (PV) modules
IEC 61730-1:2023/ IS/ IEC 61730-1: 2016	Photovoltaic (PV) module safety qualification - Part 1: Requirements for construction
IEC 61730-1:2023/ IS/ IEC 61730-1: 2016	Photovoltaic (PV) module safety qualification - Part 2: Requirements for testing
IEC 61701:2020	Salt mist corrosion testing of photovoltaic (PV) modules
IEC 61853-1: 2011	Photovoltaic (PV) module performance testing and energy rating - Part 1: Irradiance and temperature performance measurements and power rating

Standard No.	Details
IEC 61853-2: 2016 (spectral response only for solar cell or representative module)	Photovoltaic (PV) module performance testing and energy rating - Part 2: Spectral responsivity, incidence angle and module operating temperature measurements
IEC 61853-3:2018	Photovoltaic (PV) module performance testing and energy rating - Part 3: Energy rating of PV modules
IEC 61853-4:2018	Photovoltaic (PV) module performance testing and energy rating - Part 4: Standard reference climatic profiles
IEC TS 62804-1:2015	Photovoltaic (PV) modules - Test methods for the detection of potential-induced degradation - Part 1: Crystalline silicon
IEC TS 60904-1-2:2024	Photovoltaic devices - Part 1-2: Measurement of current-voltage characteristics of bifacial photovoltaic (PV) devices
IEC 60904	Reference Module calibration: c-Si reference module calibration up to the size 700 W_p
In-house test procedure	Testing of PV Module cleaning devices as per Test procedure developed by NISE
IEC 60904-9: 2020	Solar simulator characterization/calibration
IEC TS 63342:2022	C-Si photovoltaic (PV) modules - Light and elevated temperature induced degradation (LETID) test - Detection
IEC 63202-1:2019 (module also)	Photovoltaic cells - Part 1: Measurement of light-induced degradation of crystalline silicon photovoltaic cells
IEC TS 62782:2016	Photovoltaic (PV) modules - Cyclic (dynamic) mechanical load testing
In-house test procedure	Testing as per customer requirement for different products related to solar PV: Nano-coating, Quantum boost device
In-house test procedure	Long term field exposure test of PV modules
In-house test procedure	Qualification plus testing, Bankability testing of PV module in the lab as per customer requirement

NISE is also capable of providing services for the calibration of PV modules as per IEC 60904 for different technologies. NISE has developed a portable facility and methodology for the calibration of solar simulators as per IEC 60904-9.

NISE also has the capability of testing PV modules in outdoor conditions. The following tests can be conducted by the module testing lab:

- Outdoor performance test of PV modules: The performance of PV modules is measured under different irradiance and temperature conditions and then translated to STC or any other reference conditions as per IEC 60891:2021.
- Long-term outdoor performance and reliability measurement of PV modules: NISE has the

capability to carry out long-term performance and reliability testing of PV module technologies as per IEC 61724-1:2021, IEC TS 61724-2:2016, and IEC 61724-3:2016. Based on this analysis, both initial degradation (the performance drop right after installation) and long-term degradation rates (ongoing efficiency loss due to factors like temperature, UV exposure, humidity, and other climatic stresses) can be estimated.

- Grid-tied and off-grid PV system on-field testing: NISE has the capability to test both grid-tied and off-grid solar systems in the field, adhering to various applicable standards. This field testing evaluates the performance and reliability of solar power systems under real-world conditions, which is critical for assessing plant health and evaluating performance guarantees.

5.3 Solar Photovoltaic Power Converter Testing

NISE can test and evaluate the capacity of solar power conditioning units (PCUs), ranging up to 100 kVA, for all the parameters mentioned above. All types of PCUs, hybrid, standalone, grid-tied inverters (GI), MPPT systems, solar charge controllers, and pump controllers—can be evaluated for their performance and reliability as per the following standards:

NISE is capable of conducting performance testing of complete off-grid systems such as solar induction cookers, solar atta chakkis, e-rickshaws, etc. The testing results include storage autonomy, battery pack testing, safety and protection testing, and control strategy as per different applicable standards.

Table 5.2: List of test standards followed by Power Converter Testing Laboratory at NISE

Standard No.	Details
IEC/IS 61683: 1999	Photovoltaic systems-Power Conditioners-Procedure for measuring efficiency
IEC 62891:2020/ IS 17980/ EN 50530	Maximum power point tracking efficiency of grid connected photovoltaic inverters
IEC 62116: 2014/ IS 16169: 2014	Test procedure of islanding prevention measures for utility-interconnected photovoltaic inverters
IEC 62109-1: 2010/ IS 16221-1: 2016	Safety of power converters for use in photovoltaic power systems - Part 1: General requirements
IEC 62109-2: 2011/ IS 16221-2: 2015	Safety of power converters for use in photovoltaic power systems - Part 2: Particular requirements for inverters
IEC 62509: 2010/IS 16797: 2019	Battery charge controllers for photovoltaic systems - Performance and functioning
IEC 61727: 2004	Photovoltaic (PV) systems - Characteristics of the utility interface
IEC 60068-2-1: 2007	Environmental testing - Part 2-1: Tests - Test A: Cold
IEC 60068-2-2: 2007	Environmental testing - Part 2-2: Tests - Test B: Dry heat
IEC 60068-2-14; 2023	Environmental testing - Part 2-14: Tests - Test N: Change of temperature
IEC 60068-2-30: 2005	Environmental testing- Part 2-30: Tests - Test Db: Damp heat, cyclic (12 + 12 h cycle)
IEC 60529: 2013	Degrees of protection provided by enclosures (IP Code)

5.4 Battery Testing Laboratory

The battery testing and characterization facility is engaged in performance and reliability testing of major secondary battery technologies in accordance with relevant national and international standards for various capacities. Battery technologies including Lead Acid (all types), Lithium-Ion (all salts), NiMH (Nickel-Metal Hydride), NiCd (Nickel-Cadmium), and Nickel-Iron can be tested by the lab as per the standards listed in Table 5.3.

5.5 Solar Light Testing Facility

This test facility is engaged in the performance, reliability testing, and validation of solar lighting and other systems in accordance with national and international standards.

5.6 Solar Water Pump Test Facility

NISE is equipped to test a wide range of pumps, including both AC and DC models, as well as submersible and surface pumps, with capacities ranging from 0.5 hp to 50 hp. This testing capability is supported by a versatile test rig that accommodates different pipe sizes, in compliance with BIS standards and MNRE guidelines. NISE operates two distinct pump testing facilities:

Table 5.3: List of test standards followed by Battery Testing Laboratory at NISE

Standard No.	Details
IS 16270:2014	Secondary cells and batteries for solar PV application- general requirements and methods of test
IS 1651:1991	Stationary cells and batteries, lead-acid type (with tubular positive plates) - specification
IS 13369:1992	Stationary lead acid batteries (with Tubular positive plates) in Monobloc Containers
IS 15549:2005	Stationary Valve Regulated Lead Acid Batteries- Specification
IEC 61427-1: 2013	Secondary cells and batteries for renewable energy storage: General requirements and methods of test-Part-1: Photovoltaic off grid application
IS 16047 (Part3):2018 / IEC 61960-3: 2017	Secondary cells and batteries containing alkaline or other non-acid electrolytes - Secondary lithium cells and batteries for portable applications - Part 3: Prismatic and cylindrical lithium secondary cells and batteries made from them
IEC 60529: 2013	Degrees of protection provided by enclosures (IP Code)

Table 5.4: List of test standards followed by Solar Light Testing Laboratory at NISE

Standard No.	Details
MNRE specifications	MNRE Technical Specifications for White LED (W-LED) based Solar Photovoltaic Lighting systems (Lantern, Home lighting system, Street Lighting System, Torch and Task Light etc.)
Other SNA specifications	BREDA, JREDA, HREDA, PEDA etc.
IEC 62509: 2010/IS 16797: 2019	Battery charge controllers for photovoltaic systems - Performance and functioning
LM 79/IS 16106: 2012	Method of electrical and photometric Measurements of solid state Lighting (led) products
IEC 60529: 2013	Degrees of protection provided by enclosures (IP Code)

Table 5.5: List of test standards followed by Solar water pump testing lab at NISE

Standard No.	Details
IS 17018 (PART 1): 2018	Solar photovoltaic water pumping systems- Centrifugal Pumps.
MNRE specification	Testing Procedure for Solar Photovoltaic Water Pumping System as per office memorandum of MNRE (F. No. 41/3/2018-SPV Division dated 02.02.2023)
IEC 60529: 2013	Degrees of protection provided by enclosures (IP Code)
IEC 62253: 2011	Photovoltaic pumping systems - Design qualification and performance measurements

- Accommodates pipe sizes of 1, 2, 2.5, and 3 inches, with the pump head adjustable up to 100 metres
- For 2-inch pipe sizes, the head can be maintained up to 150 metres, and for pipe sizes of 3, 4, and 6 inches, it can be adjusted up to 400 metres

5.7 Solar Cell Testing Facility

NISE can test solar cells of different technologies up to a size of 6 inch × 6 inch, in accordance with the following standards:

- IEC 60904-3: 2019 Photovoltaic devices - Part 3: Measurement principles for terrestrial photovoltaic (PV) solar devices with reference spectral irradiance data
- IEC 60904-8: 2014 Photovoltaic devices - Part 8: Measurement of spectral responsivity of a photovoltaic (PV) device

5.8 Testing of Solar Powered Cold Storage

The Solar Thermal Division possesses the capability to conduct testing of solar cold storage systems incorporating thermal energy storage. The division can assess the following parameters:

- Storage capacity of the thermal energy storage system (measured in kWh)
- Cooling rates and the minimum achievable temperature within the cold storage unit
- Power requirements of auxiliary loads
- Testing of solar components and their operational functionality
- Performance evaluation using a solar photovoltaic array simulator-based approach

5.9 Solar Radiation Calibration Laboratory

The Solar Radiation Calibration Laboratory (SRCL) at NISE is equipped with precise reference standard sensors, including a primary standard sensor/ Absolute Cavity Radiometer (the highest solar radiation standard), along with several secondary standard reference sensors, enabling radiometric calibration traceable to the World Radiometric Reference (WRR) scale. The calibration facility at NISE can now transfer the latest radiometer calibration factors to radiometric sensors used in the industry.

Figure 5.1: Inter Lab Comparison of Primary Sensors at DWD Berlin

Figure 5.2: Onsite Calibration of Pyranometer at CQA, Bengaluru

In 2024-25, a total of 16 sensors were calibrated at the Solar Radiometric Calibration Facility of NISE. Additionally, inter-laboratory comparison and calibration of solar radiometers were carried out at Physikalisch-Technische Bundesanstalt (PTB), Berlin, under the Indo-German Cooperation project "Strengthening Quality Infrastructure for the Solar Industry", aimed at fostering quality infrastructure for selected metrology and testing laboratories in India.

NISE has also initiated onsite calibration of radiometers, with one such service extended to the Central Quality Assurance (CQA), Bengaluru, under the Ministry of Defence.

5.10 Standardization

NISE has provided inputs to various Ministries of the Government of India to ensure consistency, compatibility, safety, and quality of products and services in the field of solar energy. The development of robust policies, based on testing and research & development (R&D), is crucial for ensuring the efficacy, safety, and reliability of such products and services. NISE is part of various such Committees including:

- BIS ETD 28 - Solar Photovoltaic Energy Systems
- BIS CHD 06: P1 - Efficiency assessment of hydrogen generators using water electrolysers
- BIS MED 04 - Renewable Energy Sources
- MNRE Solar Cold Storage Taskforce
- Core group for weather data collection and forecasting for RE

Some of the policy inputs given by NISE is given below:

- **Quality Control Order for Solar Systems, Devices, and Components Goods:** NISE has provided inputs to MNRE regarding the QCO and series guidelines for PV module testing, to enhance efficacy from time to time.
- **BEE Star Label Rating of PV Modules for India:** NISE, along with MNRE and IIT Bombay, has developed the procedure for estimating the BEE star label rating of PV modules in India. The same has already been implemented by the Bureau of Energy Efficiency.
- **'Regulations for Construction of Renewable Energy Power Plants' by CEA:** NISE has provided technical inputs to the committee constituted by CEA for drafting the 'Regulations for Construction of Renewable Energy Power Plants.'
- **Reuse Guidelines for PV Modules for Secondary Use:** NISE prepared the first draft of the reuse guidelines for secondary use of PV modules after the end of their manufacturer-declared lifetime, and presented it to MNRE.
- **PM-KUSUM Policy Support:** NISE has provided inputs and recommendations to MNRE for the effective implementation and scaling up of the Pradhan Mantri Kisan Urja Suraksha evam Utthaan Mahabhiyan (PM-KUSUM) scheme.

CHAPTER 6

Implementation of Government Schemes and Programmes

6.1 Suryamitra Skill Development Programme

Launched in 2015 by MNRE, the Suryamitra Skill Development Programme is a visionary initiative aimed at bridging the skill gap in the renewable energy sector, with a special focus on solar PV systems. This programme is designed to train technicians at the grassroots level in the design, installation, operation, maintenance, and repair of solar PV systems.

NISE has been entrusted with the responsibility of coordinating and implementing this programme, ensuring a structured and impactful training approach to support the rapid expansion of India's solar energy ecosystem.

Achievements of the Suryamitra Programme

Skilled Workforce Developed: 60,685 individuals have successfully completed the training.

Job Creation: 30,386 trained Suryamitras have been placed in employment within the solar energy sector, reflecting a placement rate of approximately 50%.

Nationwide Coverage: Training has been delivered through a wide network of Training Partners/ Training Centers across the country, promoting regional inclusivity and accessibility.

Implementation Strategy for FY 2025-26

The program has strategically decentralized Training Centers to extend its reach to rural and semi-urban areas, enabling local communities to actively participate in and benefit from the renewable energy transition. Currently, the initiative is operational across 30 states. In FY 2024–25, a total of 3,937 Suryamitras successfully completed their training, while training and assessment for 8,863 Suryamitras is currently underway for FY 2025–26.

Table 6.1: Details of Employment Generated by NISE through the Suryamitra Skill Development Programme

Sl. No.	State	Total No. of Suryamitra	Total No. of Placed
1	Andaman and Nicobar Islands (UT)	0	0
2	Andhra Pradesh	2269	1240
3	Arunachal Pradesh (NER)	60	21
4	Assam (NER)	1650	970
5	Bihar	2066	1157
6	Chandigarh (UT)	291	175
7	Chhattisgarh	2357	1240
8	Dadra and Nagar Haveli and Daman & Diu (UT)	0	0
9	Delhi (UT)	702	336

Sl. No.	State	Total No. of Suryamitra	Total No. of Placed
10	Goa	321	202
11	Gujarat	3417	2051
12	Haryana	1649	716
13	Himachal Pradesh	564	182
14	Jammu and Kashmir (UT)	1112	293
15	Jharkhand	906	487
16	Karnataka	2041	870
17	Kerala	1005	561
18	Ladakh (UT)	30	16
19	Lakshadweep (UT)	30	0
20	Madhya Pradesh	5953	2902
21	Maharashtra	5118	2655
22	Manipur (NER)	150	50
23	Meghalaya (NER)	30	22
24	Mizoram (NER)	0	0
25	Nagaland (NER)	60	0
26	Odisha	2867	1234
27	Puducherry (UT)	121	61
28	Punjab	642	388
29	Rajasthan	4999	2904
30	Sikkim (NER)	0	0
31	Tamil Nadu	4028	2210
32	Telangana	3897	2214
33	Tripura (NER)	208	57
34	Uttar Pradesh	6430	2366
35	Uttarakhand	1150	607
36	West Bengal	4562	2199
Total		**60685**	**30386**

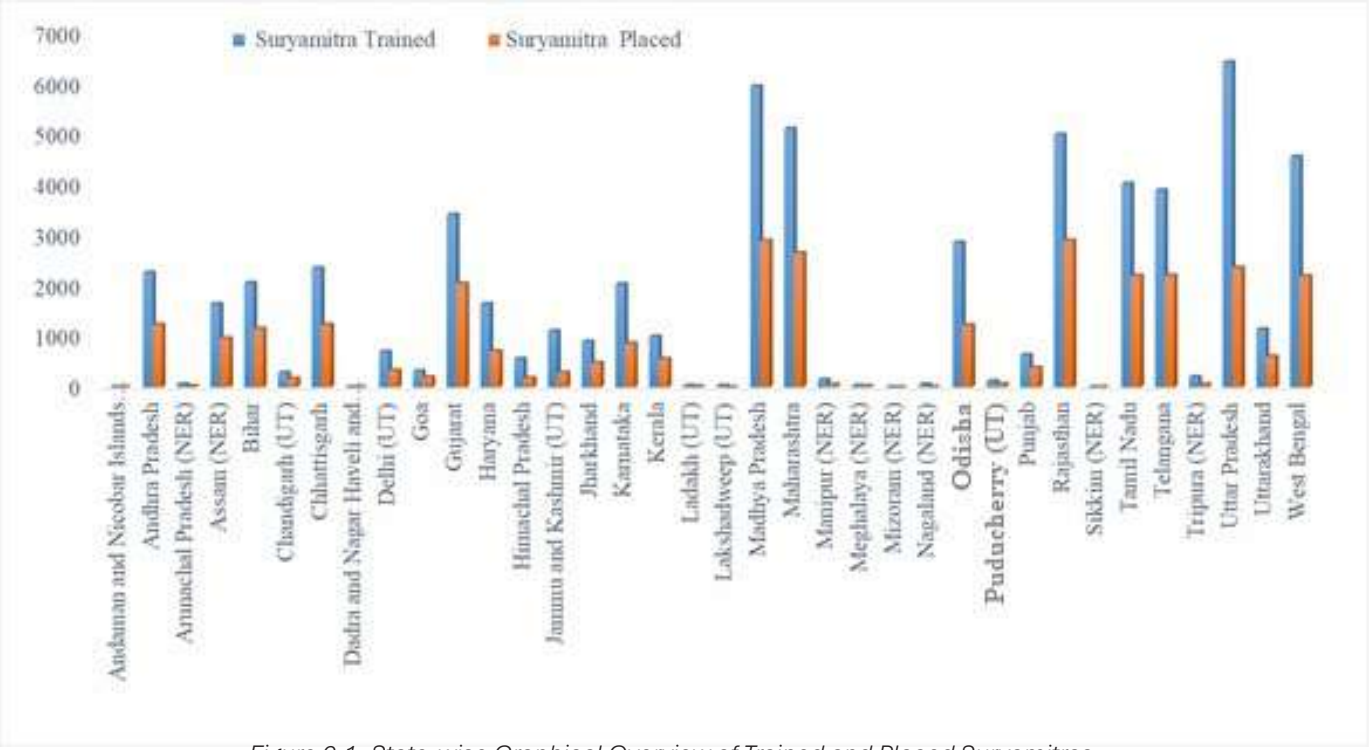

Figure 6.1. State-wise Graphical Overview of Trained and Placed Suryamitras

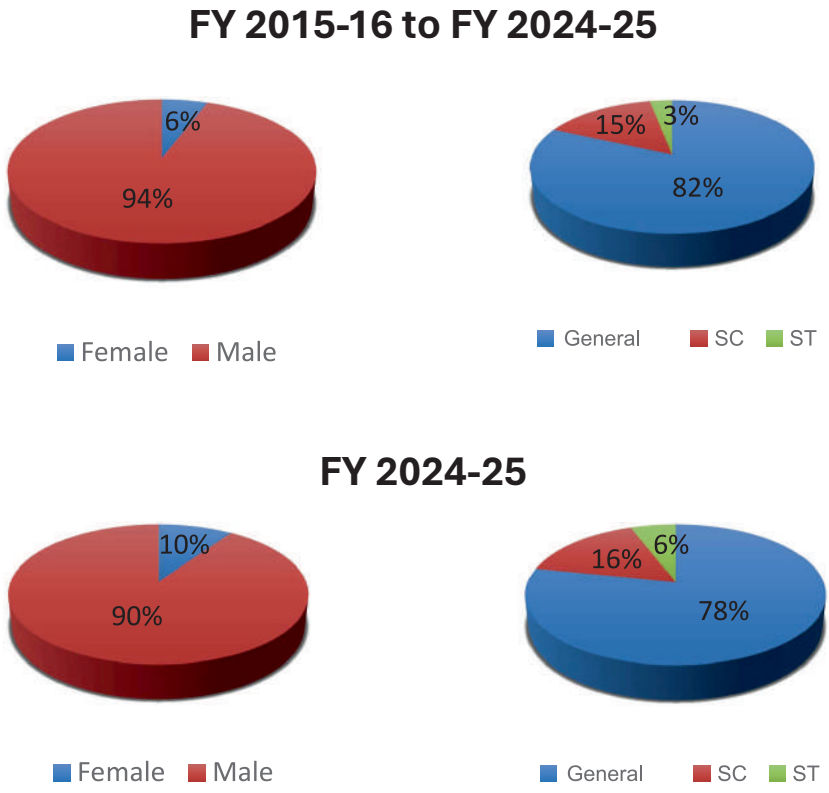

Figure 6.2: Graphical representation of trained Suryamitras by Gender and Category

Figure 6.3 (a) Glimpse from various Suryamitra trainings

Figure 6.3 (b) Participants in the Networking Event with Suryamitra Training Partners, Solar PV Developers and EPCs

Nationwide Reach: To bridge the skill gap and enhance the employability of trained Suryamitras, a "Networking Event with Suryamitra Training Partners, Solar PV Developers, and EPCs" was held at NISE on 17th December 2024 (Figure 6.3(b)).

6.2 PM Surya Ghar: Muft Bijli Yojana – Workforce Development and Training Initiative

The Government of India's approval of the PM Surya Ghar: Muft Bijli Yojana on 29th February, 2024, marks a pivotal step in accelerating rooftop solar adoption in the residential sector. With a substantial budget allocation of ₹75,021 crore, the scheme aims to:

- Enhance Rooftop Solar Capacity: Expand the share of rooftop solar in India's renewable energy mix.
- Empower Households: Enable families to generate their own electricity, reduce reliance on grid power, and promote energy independence.

Skill Development for Solar Growth

To support the goals of the PM Surya Ghar initiative and meet the rising demand for a skilled solar workforce, NISE developed Upskilling and Reskilling training modules. These were officially approved by the MNRE on 9th October 2024, and are now being implemented nationwide.

This initiative spans all expertise levels from installers to supervisors ensuring regional inclusion and widespread access to solar training.

Training Modules Approved by MNRE: Implementation Plan for FY 2025-26

1. **Solar PV Installers**
    - Target: 20,000 candidates
    - Objective: Equip individuals with the skills to safely and efficiently install solar PV systems.
    - SIDH Portal On-boarding: 10th February, 2025
    - Status: A total of 200 Training Centers have been on-boarded on the SIDH portal, and 8 batches have successfully completed their training.
2. **Rooftop Solar Supervisors**
    - Target: 10,000 candidates
    - Objective: Train professionals in project oversight, compliance, troubleshooting, and effective management of rooftop installations.
    - SIDH Portal On-boarding: Under Progress (Expected Jun 2025)
3. **On-the-Job Training (OJT) for Trained Installers/Suryamitras**
    - Target: 25,000 candidates
    - Objective: Provide hands-on experience to previously trained installers, enhancing their practical skills for real-world scenarios.
    - SIDH Portal On-boarding: Under Progress (Expected Jun 2025)

Program Rollout and Capacity

- Training Centers Allotted: 405 across India for the three training modules.
- Total Training Capacity: 55,000 candidates targeted for workforce development in the rooftop solar sector.

Expected Impact

- Skilled Workforce Development: Comprehensive training across multiple levels ensures a ready and capable solar workforce.
- National Accessibility: Training Centers enable regional inclusivity and broad reach.
- Support for National Solar Goals: Contributes to the government's target of 1 crore rooftop installations by ensuring skilled implementation.

Figure 6.4: Participants in the Master Trainers Training Programme

- Employment Generation: Creates significant job opportunities, empowering individuals to play an active role in India's clean energy transition.

During the year, NISE organized a Master Trainers Training Programme on Solar PV Installation for faculty members of the National Skill Training Institutes (NSTIs) from 24th to 25th June 2024 (Figure 6.4). The programme was conducted to enable the participants to carry out training activities under the PM Surya Ghar - Muft Bijli Yojana scheme.

6.3 Approved List of Models and Manufacturers

To ensure reliability of Solar PV products and to protect the consumer interests and ensure better energy security of the country, MNRE on 02.01.2019, has issued "Approved List of Models and Manufacturers (ALMM)" of Solar Photovoltaic Modules (Requirements for Compulsory Registration) Order, 2019. The order provides for the enlistment of eligible models and manufacturers of solar PV cells and modules complying with the BIS Standards and publishes the same in a list called the "Approved List of Models and Manufacturers". Only the models and manufacturers included in this list will be eligible for use in Government/ Government assisted Projects/Projects under Government Schemes & Program, installed in the country, including Projects setup for the sale of electricity to the Government. NISE has been designated as an implementation support agency for processing applications and carrying out inspections, verifications, and quality checks on behalf of MNRE.

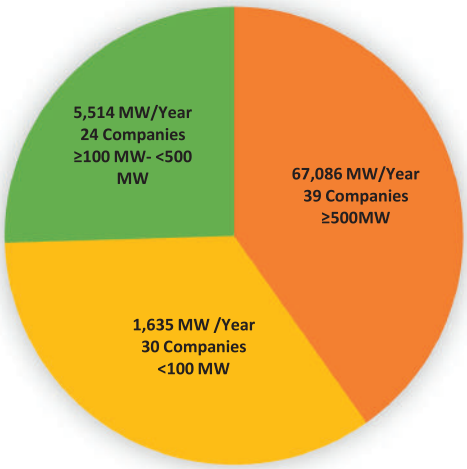

Figure 6.5: Capacity-wise distribution of ALMM listed module manufacturers (on 31st March 2025)

During FY 2024-25, NISE conducted 131 ALMM inspections of various manufacturing plants against applications of New enlistment, Renewal, Model Addition, & Capacity Addition. During the FY 2024-25, NISE inspected a cumulative manufacturing capacity of 72.40 GW/Year.

As on 31st March 2025, a total of 93 manufacturing plants are enlisted in ALMM with a total installed manufacturing capacity of 74.23 GW/Year.

Figure 6.6: Glimpse from ALMM Factory Inspections

6.4 Production Linked Incentive (PLI) Scheme: National Programme on High Efficiency Solar PV Modules

Solar Energy Corporation of India (SECI) is the implementing agency for Setting up Manufacturing Capacities for High Efficiency Solar PV Modules in India under the Production Linked Incentive Scheme (PLI Tranche-II). NISE extends technical support to SECI for qualitative & testing requirements under Production Linked Incentive Scheme (Tranche-II) which includes, throughput assessment, Commissioning Checks, testing of Module Efficiency and Temperature Coefficient as per relevant BIS/IEC standards. In 2024-25, NISE has also hosted a technical workshop to disseminate the various technical resources and information's related to the implementation of the PLI project. The workshop was attended by representatives from SECI, and representatives from manufacturers identified under PLI (Tranche II).

6.5 National Green Hydrogen Mission Testing Scheme

NISE is the Scheme Implementing Agency (SIA) for the National Green Hydrogen Mission (NGHM) Testing Scheme notified by MNRE on 04th July 2024, titled "Funding of testing facilities, infrastructure, and institutional support for development of Standards and Regulatory framework under the National Green Hydrogen Mission," with a total cost outlay of Rs 200 crores for 2024-2026. As the SIA, NISE, on 15th August 2024 floated a Call for Proposal (CfP) seeking Proposals for upgradation or setting up of new testing facilities for components, technologies and processes being used in the value chain of Green Hydrogen and its derivatives. A total of 43 Proposals were received at NISE and were scrutinized according to the Scheme guidelines for further evaluation by MNRE. As on 31st March 2025, three Proposals were approved and the remaining are under evaluation.

6.6 PM-KUSUM Scheme - Inclusion of Solar-Based Reciprocating Pumps

As part of efforts to expand the scope of the PM-KUSUM Scheme's Innovative Solar Pumping Program, NISE has aligned its initiatives with MNRE's latest specifications and testing guidelines issued on 22nd March 2023, which now include positive displacement (reciprocating/piston) pumps. This marks a significant step toward diversifying pump technologies under the scheme and enhancing efficiency across varied irrigation scenarios.

Key Updates in the Draft Guidelines:

1. The SPV pump controller must have IP68 protection (or be housed in a cabinet with IP68 protection) for submersible applications—an upgrade over the IP65 requirement for centrifugal pumps.

Table 6.2: Details of Proposals approved under NGHM Testing Scheme as on 31st March 2025

Sl. No.	Institution Name	Type of Testing	Testing Title	Approved Fund
1	Bharat Heavy Electricals Ltd. (BHEL)	New Test Facility	Development of Test Facility for PEM Fuel Cells	₹ 30 Crores
2	Gujarat Energy Research and Management Institute (GERMI)	New Test Facility	Establishing a Centre of Excellence in Hydrogen Testing	₹ 26.96 Crores
3	Sardar Swaran Singh National Institute of Bio Energy (SSS NIBE)	New Test Facility	Establishing a Hydrogen Purity Testing Laboratory at Sardar Swaran Singh National Institute of Bio-Energy, Kapurthala	₹ 5.08 Crores

2. Indicative technical specifications for solar deep well submersible positive displacement pumps are outlined below:

Table 6.3: Indicative PV Array Capacity Comparison

Sl. No.	Pump Capacity (hp)	PV Array – Reciprocating (W_p)	PV Array – Centrifugal (W_p)
1	3 hp	2100	3000
2	5 hp	3300	4800
3	7.5 hp	4500	6750
4	10 hp	6300	9000

Field Visit Observations:

- A total of 8 field sites were visited in Mysore.
- Systems have been operational for over 2 years.
- Used for multiple purposes: drip irrigation, flood irrigation and sprinkler
- Operated efficiently even at low irradiance levels (160 W/m^2).
- No major O&M issues reported by users and field staff.

CHAPTER 7

National & International Training Programmes

Solar energy industry is rapidly expanding, leading to a significant demand for skilled manpower across various sectors. Keeping in view this, NISE is organizing trainings on various aspects related to solar energy technologies through its skill development division. These training courses are designed in a way so as to meet the skilled manpower requirement of the solar energy industry and maintain quality manpower. NISE has organized numerous technical training programs for renowned academics, professionals, and members of the industry. The participants from both domestic and foreign countries have learned through the specific training curriculum introduced under various training programs in NISE.

With the continued advancement and adoption of solar energy technologies, the demand for trained and certified manpower has significantly increased in the renewable energy sector. The Skill Development Division of NISE plays a pivotal role in addressing this demand by designing and conducting training programs for a wide array of stakeholders including industry professionals, government officers, public sector units, academic institutions, and international participants.

In FY 2024–25, NISE strengthened its role as a Centre of Excellence by delivering a total of 16 training programs catering to the needs of both national and international stakeholders. These training sessions were conducted in various formats—offline, online, and hybrid—ranging from introductory to advanced level. A total of 434 participants (including 59 international participants under ITEC programs and 375 national participants) benefited from the training initiatives of NISE. The details of the national level training program conducted at NISE for the FY 2024-25 are given in Table 7.1.

7.1 National Training Programs (FY 2024–25)

NISE conducted several specialized training programs to meet the specific needs of organizations in the solar sector. These programs were tailored for military personnel, PSUs, private sector organizations, and state nodal agencies.

Table 7.1: National Training Programs conducted at NISE during FY 2024–25

S. No	Training/Program	Duration	Date	No. of Participants
1	5 Days Training for Group A Officers of Military Engineering Services	5 Days	6th – 10th May 2024	32
2	5 Days Training on Inspection & Testing of Solar PV Systems for RITES Ltd.	5 Days	10th – 14th June 2024	32
3	Master Trainers Training on Solar PV Installer (PM Suryaghar Yojna)	2 Days	24th – 25th June 2024	23
4	National Seminar with SNAs	1 Day	5th July 2024	36
5	Hydrogen Energy Training: Production, Storage & Utilization	3 Days	7th – 9th Aug 2024	10
6	Certification Training for Engineer Trainees – Renew Power Pvt. Ltd.	5 Days	9th – 13th Sep 2023	20

S. No	Training/Program	Duration	Date	No. of Participants
7	National Centre for Good Governance (NCGG) Program	1 Day	12th Sep 2024	21
8	IEC Training for M/s Renew Power	2 Days	19th – 20th Sep 2024	32
9	Performance Evaluation of Solar PV Systems	3 Days	6th – 8th Nov 2024	8
10	Networking Event with Suryamitra Partners, Developers and EPCs	1 Day	17th Dec 2024	90
11	3-Day Training on Solar PV Lab Quality Management	3 Days	16th – 18th Jan 2025	12
12	Performance Evaluation of Solar PV Systems	3 Days	21st – 23rd Jan 2025	18
13	Workshop for ANERT Officials in Solar Power Plants	2 Days	29th – 30th Jan 2025	32
14	Hydrogen Energy Training: Production, Storage & Utilization	3 Days	19th - 21st Feb 2025	9
Total National Participants Trained: 375				

Figure 7.1: Participants of the Hydrogen Training Program

Figure 7.2: Participants of Renew Pvt. Ltd Training Program

7.2 International Training Program under ITEC

The Indian Technical and Economic Cooperation (ITEC) program is an initiative of the Ministry of External Affairs (MEA), Government of India. As an empaneled institute, NISE successfully conducted two ITEC training programs in FY 2024–25 focused on Solar Energy Technologies and Applications.

These programs provided an international platform for collaborative learning and knowledge sharing among participants from Asia, Africa, and Latin America. A total of 59 international delegates were trained in the ITEC sessions.

7.3 Training Program for Industry & Public Sector Units

The NISE Skill Development Division provides customised training programs tailored to the employment roles, expertise, and needs of participants from business, academia, other organizations, and ministries who are willing to work in the field of solar energy technologies. These specially tailored training courses are created based on the individual skill requirements of the industry/organization and the participants of different experience level. These courses are made with the fundamental skill requirements offering practical experience and theoretical concept knowledge. The start-up India initiative, solar photovoltaic applications, solar industry business models, prospects for entrepreneurs in the solar sector, and other topics were all covered in this tailored training session. NISE's Skill Development Division has customized training modules for corporations and PSUs including Renew Power Pvt. Ltd., RITES Ltd., ANERT, and Military Engineering Services (MES). These trainings emphasized practical learning, performance evaluation of systems, quality management, and standards of IEC testing and certification.

These focused efforts helped bridge the skill gap in operational, testing, and strategic areas of solar deployment in the country.

Table 7.2: ITEC Training Programs (FY 2024–25)

S. No.	Program Name	Duration	Date	No. of Participants
1	ITEC-II on Solar Energy Technologies & Application	14 Days	3rd – 16th Feb 2025	30
2	ITEC-I on Solar Energy Technologies & Application	15 Days	24th Feb – 9th Mar 2025	29
Total International Participants Trained: 59				

Figure 7.3 Participants of the ITEC programme

Figures 7.4 Participants of Pradhan Mantri Surya Ghar. Training Programme

Figures 7.5 Participants of MES officers' Training Programme

7.4 Future Prospects and Developments

To further extend its outreach and impact, NISE is embarking on the following future initiatives in the domain of skill development and capacity building:

- Launch of Online Live and Recorded Training Programs: NISE is set to launch a series of online certification training courses. These programs will be available both as live instructor-led sessions and as recorded self-paced modules, accessible to learners worldwide.
- Launch of 75 Days comprehensive training program on Solar cell & Module Manufacturing Course for Diploma/B.Tech.graduates to up-skill the participants and make them employable in manufacturing industry.
- Integration of Emerging Technologies: New courses will be introduced on topics such as data analytics in solar, AI & ML applications, EV design and development, energy storage systems, and hydrogen technologies.
- Global Collaboration: Enhanced cooperation with international organizations will be pursued to host high-impact global training programs and facilitate technology transfer and cross-border learning.

These initiatives align with the institute's mission of becoming a global hub for excellence in solar energy training and research.

CHAPTER 8

Technical & Research Collaborations

NISE promotes cooperation, collaboration, knowledge exchange, and research with National and International organisations. Through the partnership initiatives, NISE extends an access to innovative technologies, technical know-how, and assistance. NISE has collaborated on commercial, product development, and training initiatives with number of organisations. The relationship has resulted in new tasks and agreements. These opportunities encourage the development of new renewable energy technology and have granted licenses for the commercialization of a range of products.

NISE actively fosters cooperation, collaboration, knowledge exchange, and joint research with both national and international organizations. Through strategic partnership initiatives, NISE facilitates access to cutting-edge technologies, technical know-how, and specialized assistance.

Collaborations have been established across various domains, including commercial ventures, product development, and training programs. These engagements have led to the initiation of new tasks and the signing of multiple agreements. hese partnerships have significantly contributed to the development of innovative renewable energy technologies and enabled the commercialization of a range of products through licensing arrangements.

During the year NISE has signed a total of 21 numbers of Memorandum of Understating (MoUs) with both Government and Private organizations for undertaking various collaborative activities including (i) Research and Innovation; (ii) Skill-development Training Program; (iii) Knowledge Exchange for Product Development, Testing, and Project execution; (iv) Joint association for organizing Seminars, Conferences, Training, and Workshops.

Table 8.1: Details for MoUs signed with Government Organizations

Sr. No	Partner	Date of Signing	Area of Collaboration
1	IIT Kanpur & Baud Resources	15th May 2025	To work together in an integrated and collaborative manner in relation to thr Renewable energy and Energy Storage – specifically for development and demonstration of gravity storage technology and other similar technologies of Solar Energy covering industries, Utilities and all other involved stakeholders.
2	Ministry of External Affairs (MEA)	21st May 2024	Provide complete technical consultancy services for implementation of the Project “Design, Procurement, Supply, Installation and Commissioning of Solar Photovoltaic Systems,” in the host country.
3	Solar Energy Corporation of India (SECI)	21st May 2024	Technical consultancy services to SECI for qualitative & testing requirements for implementation of PLI Tranche-II Scheme for setting up manufacturing capacities for high efficiency solar PV modules in India.

Sr. No	Partner	Date of Signing	Area of Collaboration
4	National Council for Cement and Building Materials (NCCB)	29th Jul 2024	Joint R&D work/projects on immediate and future requirements of country in field of solar thermal application, solar PV, green hydrogen and any other renewable energy technologies for cement industry
5	International Advanced Research Centre for Powder Metallurgy and New Materials (ARCI)	05th Sep 2024	Identify various opportunities, challenges, priorities, and best practices to promote renewable energy technologies including but not limited to Solar, Green Hydrogen, etc.
6	IIT Roorkee	10th Sep 2024	Promote academic cooperation and exchange to develop and demonstrating technologies which will be of mutual benefit to respective institutions
7	RITES Limited	19th Nov 2024	Carrying out various consultancy and quality assurance services in solar energy and other renewable energy projects of mutual interest.
8	Gandhigram Rural Institute (GRI)	22nd Nov 2024	Jointly develop Renewable/Solar Energy Lab products for skill development purpose
9	Aligarh Muslim University (AMU)	09th Dec 2024	Exploring interdisciplinary collaborations that address the technological, financial, and social aspects of RE
10	Uttar Pradesh New and Renewable Energy Development Agency (UPNEDA)	08th Jan 2025	Identify various opportunities, challenges, priorities, and best practices to promote renewable energy technologies including but not limited to Solar, Green Hydrogen, etc.
11	National Power Training Institute (NPTI)	19th Feb 2025	Jointly work to accelerate, expand, achieve the objectives of skill development programs and other associated training and capacity building programs launched by NISE/NPTI towards better employability; enhanced job creation and entrepreneurship.

Table 8.2: Details fo MoUs signed with Private Organizations

Sr. No	Partner	Date of Signing	Area of Collaboration
1	SolarScape Entreprises LLP	02nd Aug 2024	Pilot and filed studies on Building Integrated Photovoltaics (BIPV) plant at NISE
2	Graphic Era University, Dehradun	30th Sep 2024	Jointly work on policy and research for promotion of renewable energy particularly solar energy.

Sr. No	Partner	Date of Signing	Area of Collaboration
3	Uttaranchal University, Dehradun	30th Sep 2024	Jointly work to accelerate, expand and achieve the objectives of National Solar Mission through training, skill development and capacity building program launched by NISE/UU and towards better employability; enhanced job creation and entrepreneurship.
4	TriNano Technologies Pvt. Ltd.	19th Nov 2024	Enhancing PV Module Performance via Surface Engineering
5	SunSeed APV / GIZ India	06th Dec 2024	Improving agricultural co-utilization of solar rooftops
6	The Energy and Resources Institute (TERI)	20th Dec 2024	Research and development, and skilling in the area of solar energy and green hydrogen
7	P3C Technologies and Solutions Pvt. Ltd.	05th Feb 2025	Next-Gen Solar Cells - Performance and reliability studies of perovskite and perovskite-silicon tandem solar photovoltaic devices
8	Global Green Growth Institute (GGGI), India	24th Feb 2025	Promoting policy research, capacity building & training and knowledge exchange in green energy in India by creating an enabling ecosystem for scaling up Solar and Green Hydrogen projects in India.
9	Institution of Engineering and Technology (IET)	04th Mar 2025	Strengthening industry-academia partnerships for research and education
10	Attero Recycling Pvt. Ltd.	26th Mar 2025	Pilot trials, policy support, and material recovery studies for tackling solar waste through sustainable recycling solutions

Figure 8.1: Glimpses from MoUs signing and exchange

CHAPTER 9

Events & Workshops

NISE organizes vibrant array of events and workshops fostering collaboration and knowledge sharing among the workforces. From hands-on workshops to inspiring speaker series, our events have not only provided valuable learning opportunities but have also strengthened connections among participants. Each gathering was designed to address the diverse needs of our community, ensuring that everyone could find a space to engage, learn, and grow.

This year also, we proudly celebrated a diverse range of events, including Hindi Pakhwada, Swachh Bharat Abhiyan, World Environment Day, International Women's Day, International Day of Yoga, Independence Day, Republic Day, and many others.

9.1 Event on 'Ek Ped Maa Ke Naam' at NISE

Hon'ble Prime Minister launched the 'Ek Ped Maa Ke Naam' campaign, a unique initiative combining environmental responsibility with a heartfelt tribute to mothers. This campaign was inaugurated on 5th June 2024, with the planting of a Peepal tree by the Hon'ble Prime Minister at Buddha Jayanti Park in Delhi. Hon'ble Prime Minister Shri Narendra Modi emphasized the importance of collective efforts to improve the environment and spoke of India's strides in increasing forest cover over the past decade. This campaign, he said, aligns with the nation's quest for sustainable development.

NISE contributed in this noble initiative of Hon'ble Prime Minister Shri Narendra Modi by taking a step for both our Mother and Mother Earth. An event named 'Ek Ped Maa Ke Naam' under the 'Swachachta Hi Sewa - Swachachta Pakhwada' was organized at NISE on 27th September 2024. Plantation of different varieties of plants by Shri P.K. Singh, OSD, MNRE and officers of MNRE was the main attraction of this event. OSD, MNRE visited the NISE facilities including Hydrogen plant & laboratories and delivered his valuable remarks (Figure 9.1).

Figure 9.1: Tree plantation during "Ek Ped Maa ke Naam"

Figure 9.2: Visit of Sh. Bhupinder S. Bhalla, IAS, President, NISE and Secretary, MNRE to NISE

9.2 Conveying deep appreciation for the contribution of Shri Bhupinder S. Bhalla, IAS as President, NISE

Shri Bhupinder S. Bhalla, IAS, President, NISE and Secretary, MNRE, superannuated on 30th September 2024. His dedication, professionalism, expertise, and unwavering commitment to duty as President, NISE, have significantly contributed to the success of numerous projects and initiatives undertaken by the Institute. NISE expresses its sincere gratitude to Shri Bhalla for his leadership and valuable contributions and extends best wishes to him in his future endeavours (Figure 9.2).

9.3 Promotion of Official Language

During the year 2024–25, NISE made consistent efforts to ensure compliance with the provisions of the Official Language Act, 1963 and the rules framed thereunder. In order to promote the Official Language policy and create a conducive environment for the increased use of Hindi in official work, various programmes and schemes were implemented, the details of which are as under:

- Standard forms have been prepared in bilingual format and uploaded on the Institute's official website for the convenience of employees.
- All documents covered under Section 3(3) of the Official Language Act, 1963 such as circulars, press releases, general orders, etc. were issued in bilingual form.
- Replies to all letters received in Hindi were invariably given in Hindi, thereby ensuring full compliance with Rule 5 of the Official Language Rules, 1976.

In the year 2024–25, multiple initiatives were undertaken to ensure effective implementation of the Official Language Policy in the Institute. Special emphasis was laid on increasing original correspondence in Hindi. To review the progress made in the implementation of the Official Language Policy, quarterly meetings of the Official Language Implementation Committee (OLIC) were held regularly. Quarterly Progress Reports received from various departments, sections and divisions were reviewed and appropriate directions were issued to ensure adherence to the targets prescribed by the Department of Official Language. Four meetings of the Official Language Implementation Committee were held under the chairmanship of DG, NISE. The details are given in Table 9.1.

Table 9.1: Dates of meetings of the Official Language Implementation Committee

Quarter	Date	Quarter	Date
First Quarter	30.05.2024	Third Quarter	27.12.2024
Second Quarter	30.09.2024	Fourth Quarter	01.01.2025

Table 9.2: Details of Hindi Workshops organized during FY 2024-25

Workshop	Date	Subject
1st Workshop	27.05.2024	Official Language Annual Programme – Targets Fixed and Measures to be Achieved
2nd Workshop	17.09.2024	Official Language – Experimentation, Hindi Spelling and Peripheral Administrative Terminology
3rd Workshop	29.11.2024	Information on Official Language Policy and Training to Fill Quarterly Progress Reports
4th Workshop	17.03.2025	Correspondence in Hindi

As per the directives of the Department of Official Language, Ministry of Home Affairs, Government of India, a full-day Hindi Workshop is organised once every quarter at NISE, Gurugram. These workshops aim to eliminate hesitation among employees in using Hindi for official purposes. During the financial year 2024–25, four such workshops were organised. The details are given in Table 9.2.

Like every year, Hindi Pakhwada was celebrated at NISE from 14th September to 28th September 2024. During this fortnight, various competitions were organised among employees such as Hindi Essay Writing, Extempore Speech, Poetry Recitation, Dictation Competition, Noting and Drafting, and English to Hindi Translation. The participants who secured first position in the competition were awarded a certificate and a prize of ₹ 2,000/-, the participants who secured second position were awarded a certificate and a prize of ₹ 1,500/- and the participants who secured third position were awarded a certificate and a prize of ₹ 1,000/- (Figure 9.3).

A 'General Knowledge Quiz Competition' was organised by the National Cooperative Development Corporation, Gurugram under the aegis of the Town Official Language Implementation Committee (TOLIC), Gurugram. In this competition, Shri Siddharth Saroha represented NISE and secured the First Prize, which included a cash award of ₹ 2,500/- and a Certificate, presented to him by the DG, NISE (Figure 9.4).

Figure 9.3: DG, NISE awarded the prizes to the winners during the Valedictory session of Hindi Pakhwada.

Further, during the second meeting of TOLIC, Gurugram, NISE was selected for the incentive award, out of approximately 45 participating offices. On this occasion, the Memento and Certificate, awarded by TOLIC, were presented to the DG, NISE (Figure 9.5).

Figure 9.4: First prize certificate awarded by TOLIC, Gurugram, was presented to Shri Siddharth Saroha by DG, NISE

Figure 9.5: Shri Sandeep Sehrawat presenting the commemorative memento and certificate awarded by TOLIC, Gurugram to DG, NISE

Figure 9.6: An interactive session on "Health and Hygiene" by Dr. Namita Mathur

9.4 Interactive Session on "Health and Hygiene" at NISE

An interactive session on "Health and Hygiene" was conducted at NISE on 26th September 2024 by Dr. Namita Mathur, Chairperson, International Institute of Health and Hygiene. Dr. Namita shared her valuable thoughts and information about health and hygiene. All Regular Officers, Project staff, Contractual staff, Outsourced Staff, Support Staff, Trainees, etc. have taken advantage of this interactive session (Figure 9.6).

9.5 Interaction session with sanitation, horticulture, civil and electrical maintenance staff and distribution of safety kits

An interaction session under the 'Swachachta Hi Sewa - Swachachta Pakhwada' was conducted at NISE Campus on 30th September 2024 to share information about government of India's welfare schemes. All housekeeping, sanitation, horticulture, civil and electrical maintenance staff participated in this event. Safety kits were distributed to the said staff after completion of the event to ensure safety of staff during operation and maintenance activities carried out by them (Figure 9.7). Details of this event were also uploaded on the Swachachta Hi Sewa (SHS) Portal.

9.6 A talk on waste management to achieve Sustainable Development Goals (SDGs)

In order to achieve Sustainable Development Goals (SDGs) a talk on waste management was conducted at NISE on 30th September 2024. Detailed presentation about the positive effects, statistics, health implications, technology and innovation, and the role of government in managing waste was conducted by Ms. Varsha from Saahas Zero Waste: Professional Waste Management Services. After the presentation a brain storming session was conducted regarding implementation of Five 'R's i.e. Refuse, Reduce, Reuse, Repurpose and Recycle as these are closely related to waste management.

Key take away of this event was to promote crucial role of general public in waste management by raising awareness, participating in cleanliness drives, promoting sustainable practices, and advocating for policy changes.

Emphasis was also given on contribution of individuals for reducing waste generation through actions like reducing single use plastic consumption, reusing materials, and supporting recycling programs. All officers of administration have taken advantage of this interactive session (Figure 9.8).

Figure 9.7: An interaction session under the 'Swachachta Hi Sewa - Swachachta Pakhwada'

Figure 9.8: Ms. Varsha from Saahas Zero Waste: Professional Waste Management Services delivered a talk on waste management to achieve SDGs

9.7 Safai Mitra Suraksha Shivir followed by a preventive health talk and free health check-up camp at NISE Campus

A preventive health check-up is a medical examination that is conducted to detect potential health problems before they become more serious. The purpose of a preventive health check-up is to identify health risks early on, so that appropriate action can be taken to prevent or treat any potential health problems.

As part of 'Swachachta Hi Sewa - Swachachta Pakhwada' a 'Safai Mitra Suraksha Shivir' followed by a 'Preventive health talk and free health check-up camp' was conducted at NISE Campus on 01st October 2024 by the Artemis Hospital, Gurugram. Team of specialist doctors of Artemis Hospital shared important information about sign and symptoms of heart diseases, heart attack, neck pain, back pain, knee pain, headache, migraine, cervical shoulder pain, frozen shoulder pain etc. Crucial information and procedure to handle medical emergency was also explained in detail. All Regular Officers, Project staff, Contractual staff, Outsourced Staff, Support Staff, Trainees, etc. have taken advantage of this interactive session.

All Regular Officers, Project staff, Contractual staff, Outsourced Staff, Support Staff, Trainees, etc. were also benefitted by free of cost services of highly specialised medical experts such as Cardiologist, Orthopaedics and General Physician etc. The staff was also benefitted by utilizing various tests facilities such as RBS, BP, ECG provided free of cost by Artemis Hospital in NISE Campus (Figure 9.9).

9.8 Science Education/Knowledge Dissemination

NISE organised an Open Day event held on 25th October 2024 as part of the 12th Foundation Day celebrations, engaging the students and general public. Over 200 students from 5 government and private schools participated and were educated through live demonstrations of solar products, poster presentations, and guided laboratory visits. Additionally, during FY 2024-25 total 8 schools visited NISE campus and around 475 students were given exposure in the field of solar energy (Figure 9.10).

Figure 9.9: 'Preventive health talk and free health check-up camp' conducted at NISE Campus on 01st October 2024

Figure 9.10: NISE organised Open Day for public and students on 25th October 2024 on the occasion of its 12th Foundation Day Celebrations

9.9 Technical Exposure Visits at NISE

NISE organized a total of 39 technical visits, reaching approximately 1,330 participants and facilitating exposure to solar and renewable energy technologies for diverse groups. These visits promoted awareness and knowledge exchange, introducing emerging renewable energy solutions to a wide range of audiences. Among the participants, 475 school students from 8 different government and private schools were engaged, while 266 college students, 248 government officials, 186 professionals from the private sector, and 155 international participants also took part (Figures 9.11 to 9.14).

9.10 World Environment Day

'World Environment Day' was organized at NISE on 5th June 2024. Shri Yugal Kishore Joshi, Advisor, Niti Aayog, joined the DG-NISE & DG ISA in key discussions on renewable energy and sustainability (Figure 9.15). As part of the event, they also planted a tree on Environment Day, symbolizing their joint commitment to green energy and environmental protection (Figure 9.16).

Figure 9.11: Visit of students and faculty members from Aligarh Muslim University on 10th February 2025

Figure 9.12: Visit of students from Ladakh as part of the National Integration Tour under Operation Sadbhavana organized by the Indian Army on 6th December 2024

Figure 9.13: Visit of delegates from G20 countries on 6th December 2024

Figure 9.14: Visit of students from Delhi Public School Ghaziabad, Palam Vihar on 12th December 2024

Figure 9.15: DG, NISE welcoming Sh. Yugal Kishore Joshi, Advisor NITI Aayog at NISE

Figure 9.16: Tree plantation on World Environment Day 2024

9.11 International Day of Yoga

The International Day of Yoga was organized at NISE on 21st June 2024. The special invitee, Shri Sonu Ram, Yoga Instructor, conducted a yoga session with NISE officers (Figure 9.17).

9.12 Independence Day Celebration

On 15th August, 2024, the Independence Day was celebrated with great enthusiasm at NISE. On this auspicious occasion of Independence Day, DG, NISE hoisted the tricolor in NISE campus (Figure 9.18).

Figure 9.17: NISE staff practicing Yoga on International Day of Yoga, 2024

Figure 9.18: Independence Day celebrations at NISE campus

9.13 National Constitution Day

NISE celebrated National Constitution Day on 29th November 2024, during which all personnel took the Constitution Day oath (Figure 9.19).

9.14 Republic Day

Republic Day was celebrated with great enthusiasm at NISE on 26th January 2025. The National Flag was hoisted by DG, NISE in the courtyard of Surya Bhawan (Figure 9.20). On this occasion, a parade was also organized by the security personnel of NISE.

Figure 9.19: Oath during celebration of Constitution Day, 2024

Figure 9.20: Celebration of Republic Day, 2025 at NISE campus

9.15 International Women's Day

In compliance with the order of the Ministry of Women and Child Development, International Women's Day was organized at the NISE on 08th March 2025 (Figure 9.21). This time the theme of International Women's Day 2025 was "For ALL Women and Girls: Right, Equality & Empowerment".

Figure 9.21: Celebration of International Women's Day, 2025

CHAPTER 10

Finance and Accounts

NISE has an Internal Finance Division (IFD) and a Finance & Accounts Division (F&A) which look after the concurrence and preparation of accounts, respectively. IFD scrutinises and provide financial concurrence to the proposal for payments, whereas the F&A division deals with budget preparation, maintenance of accounts and audit functions. NISE is registered with Income Tax as well as GST and complies with all the statutory provisions of both the Act. The statutory auditor of NISE is appointed out of the panel of Chartered Accountants provided by CAG. The annual accounts are approved by the Finance Committee (FC) before submission of the same to the Governing Council (GC) and Annual General Meeting (AGM).

AJAY GAUR & ASSOCIATES
(Chartered Accountants)

Ref. No. ..... Dated. 19/08/2025

INDEPENDENT AUDITOR'S REPORT

To the Members of NATIONAL INSTITUTE OF SOLAR ENERGY

Report on the Financial Statements

We have audited the financial statements of **NATIONAL INSTITUTE OF SOLAR ENERGY(NISE),** which comprise the balance sheet as at 31st March 2025, and the statement of Income & Expenditure for the year ended on that date, and a summary of significant policies and other explanatory information.

Responsibility of Management for the Financial Statements

The Management is responsible for the preparation of these financial statements that gives a true and fair view of the financial position and financial performance of the Institute in accordance with the accounting principles generally accepted in India. This responsibility also includes: Maintenance of adequate accounting records in accordance with the provisions of the Act for safeguarding the assets of the Institute and for preventing and detecting frauds and other irregularities; Selection and application of appropriate accounting policies; Making judgments and estimates that are reasonable and prudent; and Design, implementation and maintenance of adequate internal financial controls that were operating effectively for ensuring the accuracy and completeness of the accounting records, relevant to the preparation and presentation of the financial statements that give a true and fair view and are free from material misstatement, whether due to fraud or error.

Auditor's Responsibilities for the Audit of the Financial Statements

1. Our responsibilities are to express an opinion to obtain reasonable assurance about whether the financial statements as a whole are free from material misstatement, whether due to fraud or error, and to issue an auditor's report that includes our opinion. Reasonable assurance is a high level of assurance, but is not a guarantee that an audit conducted in accordance with SAs will always detect a material misstatement when it exists. Misstatements can arise from fraud or error and are considered material if, individually or in the aggregate, they could reasonably be expected to influence the economic decisions of users taken on the basis of these financial statements.

2. As part of an audit in accordance with Standards on Auditing, we exercise professional judgment and maintain professional skepticism throughout the audit. We also:

Ajay Gaur & Associates GURGAON Chartered Accountants

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Branch 2 : Block-A, House No-152, Ground Floor, Shankar Garden, Vikaspuri, New Delhi-110018,
Branch 3 : E-5 Nawal Sagar Well, Bikaner Rajasthan-334001

- Identify and assess the risks of material misstatement of the financial statements, whether due to fraud or error;
- Design and perform audit procedures responsive to those risks and obtain audit evidence that is sufficient and appropriate to provide a basis for our opinion.
- Understand that the risk of not detecting a material misstatement resulting from fraud is higher than for one resulting from error, as fraud may involve collusion, forgery, intentional omissions, misrepresentations, or the override of internal control.
- Evaluate the appropriateness of accounting policies used and the reasonableness of accounting estimates and related disclosures made by management.
- Evaluate the overall presentation, structure and content of the financial statements, including the disclosures, and whether the financial statements represent the underlying transactions and events in a manner that achieves fair presentation.

3. **Materiality** is the magnitude of misstatement in the financial statements that, individually or in aggregate, makes it probable that the economic decisions of a reasonably knowledgeable user of the financial statements may be influenced. We consider quantitative materiality and qualitative factors in:

- Planning the scope of our audit work; and
- Evaluating the results of our work and the effects of identified misstatements in the financial statements, if any.

Report on Other Legal and Regulatory Requirements

1. During the course of our audit, certain observations were noted and are presented in **Annexure-A** in summarized form. The detailed observations have been separately communicated to the management, which has noted them for future compliance.
2. We report that:

a) We have sought and obtained all the information and explanations which to the best of our knowledge and belief were necessary for the purpose of our audit;

b) In our opinion, proper books of account as required by law have been kept by the Institute so far as it appears from our examination of those books;

c) The Balance Sheet and the Statement of Income & Expenditure dealt with by this Report are in agreement with the books of account;

Ajay Gaur & Associates GURGAON Chartered Accountants

d) In our opinion, the aforesaid Balance Sheet and Statement of Income & Expenditure comply with the Accounting Standards issued by the Institute of Chartered Accountants of India, to the extent applicable.

Opinion

In our opinion and to the best of our information and according to the explanations given to us, the financial statements, read together with **Annexure-A**, give the information required by the Act in the manner so required and give a **true and fair view** in conformity with the accounting principles generally accepted in India:

a) In the case of the **Balance Sheet**, of the **State of affairs** of the Institute as at **31st March 2025**;

b) In the case of the **Statement of Income & Expenditure**, of the **excess of income over expenditure** for the year ended on that date.

For M/S Ajay Gaur & Associates,
Chartered Accountants
(FRN:013124C)

(CA Kailash Daga)
Partner
M. No. 432247
UDIN: 25432247BMJNSS7491

Place: Gurugram
Dated: August 19, 2025

Annexure -A

Annexure to the Independent Audit Report on the Financial Statement of National Institute of Solar Energy for the F.Y. 2024-25 as referred in the said Report.

1. It has been observed that NISE has given advances amounting to Rs. 13.06 crore to CPWD for execution of various works, including Rs.2.90 crore for construction of residential quarters, which are still outstanding for settlement as on 31.03.2025. The details of advances released since FY 2022-23 along with the opening balance as on 01.04.2022 are as under:

Advances given to CPWD	
Date	**Amount**
As on 01Apr 2022	4,31,39,530/-
08 Dec 2022	54,67,581/-
08 Dec 2022	52,95,780/-
14 Dec 2022	39,35,906/-
28 Mar 2023	32,26,178/-
28 Mar 2023	64,06,000/-
20 Mar 2024	57,22,500/-
27 Mar 2024	2,97,007/-
19 Nov 2024	12,09,096/-
20 Nov 2024	2,90,31,800/-
20 Feb 2025	2,68,87,598/-
Total	**13,06,18,976/-**

As evident from the above, advances released to CPWD have been lying unsettled for the last four years. However, the management has obtained the latest status of works from CPWD, which indicates that the unspent balance with CPWD, as of 06.05.2025, is Rs. 4,06,78,613/-.

Recommendation:

It is recommended that NISE may obtain the settlement of the completed works from CPWD. Further release of funds may be linked with settlement of earlier advances to avoid accumulation of outstanding balances.

2. It has been observed that NISE had released an advance of Rs. 6,42,000/- during FY 2016-17 to *M/s Rajasthan Renewable Energy Corporation* for conducting the *Suryamitra Training Program*. However, the said advance continues to remain outstanding in the books of accounts till date.

Recommendation:

It is recommended that NISE may immediately pursue the matter with *M/s Rajasthan Renewable Energy Corporation* to obtain the *Utilization Certificate* for the advance released. In case the amount has not been utilized for the intended purpose, NISE should take necessary steps to recover the amount along with applicable interest.

3. It has been observed that NISE had paid an advance of Rs. 2,00,00,000/- during the financial year 2014-15 and Rs. 7,31,550/- in the FY 2015-16 to C-DAC, which is still outstanding in the books of accounts. As informed by the management, the matter is presently under arbitration at C-DAC.

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Recommendation:

It is recommended that NISE may take necessary steps to expedite to resolve the matter at the earliest so as to settle the outstanding advance.

4. It has been observed that an advances (Credit Balance) aggregating to Rs. 33,13,33,135/-are appearing under ALMM Scheme as on 31.03.2025, while no revenue has been recognized against these advances in the books of accounts for FY 2024–25.

The Details of major customers are given below covering 83% of total advance amount:

Particulars	Opening Balance 01.04.2024	Debit	Credit	Closing Balance 31.03.2025
Astronergy New Energy Technology	-	-	27459686.00	27459686.00
Hangzhou Relno Standards Technical	3125923.00	-		3125923.00
HEFEI GCL System Integration	6075819.00	-		6075819.00
Hefei JA Solar Technology Co. Ltd.	13990394.00	-		13990394.00
JA Solar Tech. Yangzhou Co. Ltd.	7070617.00	-		7070617.00
JA Solar Vietnam Company Ltd.	5948668.00	-		5948668.00
JA Solar (XINGTAI) Co. Ltd.	7273600.00	-		7273600.00
Jinko Solar Co. Ltd., Shangrao	62166648.00	-	10620000.00	72786648.00
Longi Solar Technology Co. Ltd - ALMM	84252000.00	-		84252000.00
Navitas Solar Private Limited	-	-	2892000.00	2892000.00
Premier Energies Global Environment Private Limited	-	-	2477315.00	2477315.00
Solar Space Technology Co. Ltd	-	-	3129360.00	3129360.00
Trina Solar Energy	21632149.00	-		21632149.00
Yiwu Ja Solar Technologies Co. Ltd	16742139.00	-		16742139.00
Total Amount	**228277957.00**		46578361.00	**274856318.00**

Recommendation:

It is recommended that the management may reconcile the accounts with the corresponding customers and take necessary action for the above balances at the earliest.

5. It has been observed that an amount of Rs. 6,10,973/- (debit balance) has been short received against the invoices raised under the ALMM Scheme. The details of customers with outstanding balances are as under:

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Sr.no.	Customer Name	Amount
1.	Ameya Solar and Semiconductors Pvt Ltd	3020.00
2.	Akshaya Solar Power India Private Limited	3347.00
3.	Asote Solutions Private Limited	48941.00
4.	Indo Solar Limited-ALMM	216400.00
5.	Knack Energy Private Limited	200662.00
6.	Swelect IIIIV Solar Photovoltaics Pvt. Ltd.	138603.00
	Total	6,10,973.00

Recommendation:

It is recommended that the management may reconcile the accounts and take necessary action for recovery of the short-received amount at the earliest.

6. It has been observed that an amount of Rs. 30,03,605/- is appearing under *Advance Received from Customers* towards testing services for the past several years, against which no revenue has been recognized in the books of accounts.

Recommendation:

It is recommended that advances outstanding for a period exceeding three years may be reviewed and considered for recognition as revenue of the Institute.

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NATIONAL INSTITUTE OF SOLAR ENERGY

(An Autonomus Institute of Ministry of New & Renewable Energy ,Govt.of India)
Gurugram-Faridabad Road, Gwalpahari, Gurugram, Haryana-122003

BALANCE SHEET AS AT 31st MARCH 2025

Amount in ₹

CORPUS/CAPITAL FUND AND LIABILITIES	SCHEDULE	AS AT MARCH 31, 2025		AS AT MARCH 31, 2024	
		TOTAL		TOTAL	
Corpus/Capital Fund					
Gross Corpus/ Capital Fund	1	66,20,82,722	66,20,82,722	52,38,58,652	52,38,58,652
Reserve & Surplus	2	1,44,88,87,842		1,30,10,47,481	
Less : Accumulated Depreciation		69,33,47,140		60,97,62,790	
			75,55,40,701		69,12,84,691
Current Liabilities & Provisions	3	39,08,08,508	39,08,08,508	50,90,84,595	50,90,84,595
Total			**1,80,84,31,931**		**1,72,42,27,937**

ASSETS	SCHEDULE	AS AT MARCH 31, 2025		AS AT MARCH 31, 2024	
		TOTAL		TOTAL	
Fixed Assets	4				
Gross Block		1,27,92,65,204		1,22,77,34,632	
Less : Accumulated Depreciation		69,33,47,140		60,97,62,790	
Net Block			58,59,18,064		61,79,71,842
Current Assets, Loans & Advances	5	1,22,25,13,868	1,22,25,13,868	1,10,62,56,095	1,10,62,56,095
Total			**1,80,84,31,931**		**1,72,42,27,937**
SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO ACCOUNTS	14				

As per our Audit Report of even date
For M/s Ajay Gaur & Associates,
Chartered Accountants
(FRN-013124C)

Ajay Gaur & Associates GURGAON Chartered Accountants

(CA Kailash Daga)
(Partner)
M. No.432247
UDIN: 25432247BMJNSS7491

Place: Gurugram
Dated: 19.08.2025

For NATIONAL INSTITUTE OF SOLAR ENERGY

(Dr. Chandan Banerjee)
Dy. Director General

(Dr. Mohammad Rihan)
Director General

NISE गुरुग्राम Gurugram

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Amount in ₹

INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED ON 31ST MARCH 2025

PARTICULARS	Schedule	2024-25 TOTAL	2023-24 TOTAL
INCOME			
Receipts from Testing & Operations	6	14,59,80,496	9,32,98,600
Grants/Subsidies utilised for Revenue Expenditure	7	34,68,21,537	20,75,69,395
Interest Earned	8	6,02,75,359	8,37,37,823
Other Income	9	1,70,00,833	15,46,634
Depreciation (As per Contra)	4	8,35,84,350	8,57,13,990
Total (A)		***65,36,62,574***	***47,18,66,443***
EXPENDITURE			
Establishment Expenses	10	8,13,06,284	5,39,07,206
Other Administrative Expenses	11	11,48,40,656	7,51,94,657
Operational/Project Expenses	12	21,40,68,499	10,45,27,694
Interest on Grant & CNA Account	13	1,16,38,715	2,30,87,919
Depreciation (As per Contra)	4	8,35,84,350	8,57,13,990
Total (B)		***50,54,38,504***	***34,24,31,466***
Net Surplus/(Deficit) for the year (A-B)		***14,82,24,070***	***12,94,34,977***
Less: Provision for Taxation		-	-
Balance being Surplus/(Deficit) for the year transferred to General Reserve		***14,82,24,070***	***12,94,34,977***
SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO ACCOUNTS	14		

As per our Audit Report of even date
For M/s Ajay Guar & Associates,
Chartered Accountants
(FRN-013124C)

Ajay Gaur & Associates GURGAON Chartered Accountants

(CA Kailash Daga)
(Partner)
M. No.432247
UDIN: 25432247BMJNSS7491

Place: Gurugram
Dated: 19.08.2025

For NATIONAL INSTITUTE OF SOLAR ENERGY

(Dr. Chandan Banerjee)
Dy. Director General

(Dr. Mohammad Rihan)
Director General

NISE गुरुग्राम Gurugram

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 1- CORPUS/ CAPITAL FUND	AS AT MARCH 31, 2025		AS AT MARCH 31, 2024	
		Total		Total
Capital Fund				
Balance as at the beginning of the year	51,38,58,652		38,44,23,675	
Add : Excess of income over expenditure during the year	14,82,24,070	66,20,82,722	12,94,34,977	51,38,58,652
Corpus Fund				
Balance as at the beginning of the year (Refer Grant Sheet)	1,00,00,000		1,00,00,000	
Add: Amount received during the Year	-		-	
Less: Amount Refunded during the Year	1,00,00,000		-	
Closing Balance		-		1,00,00,000
Total		**66,20,82,722**		**52,38,58,652**

Ajay Gaur & Associates GURGAON Chartered Accountants

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 2- RESERVE & SURPLUS	AS AT MARCH 31, 2025		AS AT MARCH 31, 2024	
		Total		Total
Capital Reserve				
Grants adjusted against purchase of assets				
Opening Balance	1,20,90,69,814		1,14,87,92,387	
Add : Addition during the period	6,81,50,711		6,02,77,427	
Closing Balance		1,27,72,20,525		1,20,90,69,814
Grant utilised for advances given during the year				
Opening Balance	9,19,77,667		8,15,31,154	
Add : Net Adjusted during the Year	7,96,89,650		1,04,46,513	
Closing Balance		17,16,67,317		9,19,77,667
Total		**1,44,88,87,842**		**1,30,10,47,481**

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NISE Gurugram

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 3- CURRENT LIABILITIES AND PROVISIONS	AS AT MARCH 31, 2025	Total	AS AT MARCH 31, 2024	Total
Current Liabilities				
Sundry Creditors				
- For Goods and Services				
-For 1 year	93,627		79,068	
-For more then 1 year	3,87,170	4,80,797	3,86,171	4,65,239
- Creditors For Capital Goods				
-For 1 year	2,03,177		89,44,707	
-For more then 1 year	6,46,714	8,49,891	85,53,272	1,74,97,979
Deposits				
- Earnest Money Deposits	12,15,810		14,16,113	
- Security Deposits	20,43,962		8,27,947	
- Deposit (Others)	1,24,787		1,21,785	
- Deposit (SERB)	-		2,90,250	
- Deposit (UNICEF)	-		21,54,805	
- Advance Received from Customers- ALMM	33,13,33,135		27,33,77,075	
- Advance Received from Customers (Testing/Training/Consultancy etc.)	65,29,193	34,12,46,887	78,78,134	28,60,66,109
Deposits - Central Nodal Accounts				
- Under HRD Scheme - 4110 (Unspent balance under CNA Account)	47,29,184		1,84,57,323	
- Under R&D Scheme - 4112 (Unspent balance under CNA Account)	22,414	47,51,598	5,45,09,867	7,29,67,190
Statutory Liabilities				
- TDS Payable under Income Tax	59,77,964		46,90,017	
- GST Payable (Incl TDS under GST)	9,61,456	69,39,420	22,26,252	69,16,269
Other Current Liabilities				
- Salary & Remuneration Payable (Incl. National Pension Fund)	20,39,897		7,27,615	
- Interest refundable to Ministry	31,26,712		1,71,19,420	
- Utilitiy Charges (ISA)	84,03,280		44,91,042	
- Other misc. liabilities	14,618	1,35,84,507	50,182	2,23,88,259
Balance of Grants Payable to Government of India	1,703	1,703	9,77,24,711	9,77,24,711
Provisions				
Provision for Gratuity	79,66,190		-	
Provision for Leave Encashment	81,22,178		-	
Provision for Expenses	68,65,337	2,29,53,705	50,58,839	50,58,839
Total		**39,08,08,508**		**50,90,84,595**

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CHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

CHEDULE 4- FIXED ASSETS & DEPRECIATION

Amount in ₹

PARTICULARS		GROSS BLOCK					DEPRECIATION						NET BLOCK	
	Rate	As at 01.04.2024	Addition before 180 days	Addition After after 180 days	Sales/ Adjustment during the year	As at 31.03.2025	As at 01.04.2024	Current Depreciation on N+C	Current Depreciation on D	Adjustment during the year	Total Current Year Depreciation 31.03.2025	Total Depreciation (G+J)	WDV as on 31.03.2025 (F-L)	WDV as on 31.03.2024
A		B	C	D	E	F	G	H	I	J	K	L	M	N
00 KW Power Plant	15.00%	6,97,61,662	-	-	-	6,97,61,662	3,60,76,840	50,52,723	-	-	50,52,723	4,11,29,563	2,86,32,099	3,36,84,822
ir Conditioner	15.00%	27,38,992	-	-	-	27,38,992	17,91,774	1,42,083	-	-	1,42,083	19,33,857	8,05,135	9,47,218
ssets under Solar Tower	15.00%	1,99,16,715	-	-	-	1,99,16,715	81,28,506	17,68,231	-	-	17,68,231	98,96,737	1,00,19,978	1,17,88,209
udio Video System	15.00%	98,70,460	54,90,840	-	-	1,53,61,300	7,40,285	21,93,152	-	-	21,93,152	29,33,437	1,24,27,863	91,30,176
ooks/Standards and Periodicals	40.00%	50,18,740	-	-	-	50,18,740	31,65,562	7,41,271	-	-	7,41,271	39,06,833	11,11,907	18,53,178
uilding-NISE	10.00%	62,63,02,751	-	-	-	62,63,02,751	31,59,55,694	3,10,34,706	-	-	3,10,34,706	34,69,90,400	27,93,12,351	31,03,47,057
amera including fiber cable	15.00%	1,22,28,570	29,01,688	12,85,000	-	1,64,15,258	9,17,143	21,31,967	96,375	-	22,28,342	31,45,485	1,32,69,773	1,13,11,427
esktop Computers	40.00%	1,45,79,372	-	20,56,046	-	1,66,35,418	1,24,92,823	8,34,620	4,11,209	-	12,45,829	1,37,38,652	28,96,766	20,86,549
urniture & Fixtures	10.00%	1,66,18,856	24,780	-	-	1,66,43,636	59,29,997	10,71,364	-	-	10,71,364	70,01,361	96,42,275	1,06,88,859
aptops	40.00%	26,26,954	-	-	-	26,26,954	20,86,044	2,16,364	-	-	2,16,364	23,02,408	3,24,546	5,40,910
isc. Assets Guest House/ Office	15.00%	2,28,72,144	99,352	8,94,900	-	2,38,66,396	1,59,93,974	10,46,628	67,118	-	11,13,746	1,71,07,720	67,58,676	68,78,170
ther Assets (Training)	15.00%	86,02,190	-	-	-	86,02,190	58,98,503	4,05,553	-	-	4,05,553	63,04,056	22,98,134	27,03,687
rinters and other IT Peripherals	15.00%	4,70,54,257	23,173	-	-	4,70,77,430	2,29,66,290	36,16,671	-	-	36,16,671	2,65,82,961	2,04,94,469	2,40,87,967
O System	10.00%	2,30,400	-	-	-	2,30,400	1,16,143	17,139	-	-	17,139	1,33,282	97,118	1,14,257
cientific & Laboratory Equipments	15.00%	35,60,78,165	-	2,49,98,825	8,68,650	38,02,08,340	16,85,69,990	2,80,39,147	18,74,912	2,88,121	2,96,25,938	19,81,95,928	18,20,12,412	18,75,08,175
cientific & Laboratory Equipments (DST oject)	15.00%	14,91,000	42,22,736	-	-	57,13,736	3,18,701	8,09,255	-	-	8,09,255	11,27,956	45,85,780	11,72,299
oftwares	40.00%	91,98,310	-	9,89,430	-	1,01,87,740	72,00,038	7,99,309	1,97,886	-	9,97,195	81,97,233	19,90,507	19,98,272
ransformer	15.00%	16,29,733	-	-	-	16,29,733	8,42,807	1,18,039	-	-	1,18,039	9,60,846	6,68,887	7,86,926
ehicles	15.00%	9,15,361	-	8,27,200	-	17,42,561	5,71,677	51,553	62,040	-	1,13,593	6,85,270	10,57,291	3,43,684
/ebmail, Multifactor Auth.& Contextual ccess	25.00%	-	-	85,85,252	-	85,85,252	-	-	10,73,157	-	10,73,157	10,73,157	75,12,096	-
otal		1,22,77,34,632	1,27,62,569	3,96,36,653	8,68,650	1,27,92,65,204	60,97,62,790	8,00,89,775	37,82,696	2,88,121	8,35,84,350	69,33,47,140	58,59,18,064	61,79,71,842

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NISE Gurugram

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025 — Amount in ₹

SCHEDULE 5- CURRENT ASSETS, LOANS & ADVANCES	AS AT MARCH 31, 2025	Total	AS AT MARCH 31, 2024	Total
Current Assets				
Balances with Bank :				
-Saving & Current Accounts	3,06,24,256		1,71,47,175	
-Auto Sweep Accounts	4,26,24,477		11,53,83,638	
-Central Nodal Accounts	1,10,26,102	8,42,74,835	14,65,33,625	27,90,64,437
Fixed Deposits:				
Fixed Deposits -Core & Project Grant	-		5,12,46,340	
Fixed Deposits - Internal Generated Revenue	15,55,55,977		13,67,82,031	
Fixed Deposits - ALMM	42,55,88,705		27,97,76,608	
Fixed Deposits- Corpus Fund	27,11,98,948	85,23,43,630	19,81,34,806	66,59,39,785
Sundry Debtors:				
Sundry Debtors				
-For 1 Year	1,79,579		16,01,704	
-For More than 1 Year	60,28,914	62,08,493	67,10,831	83,12,535
Debtors Under ALMM (For 1 Year)	**6,10,973**	6,10,973	72,540	72,540
Loan & Advances & other assets				
Advances and other amounts recoverable in cash or in kind or for value to be received				
- Advances for capital assets				
-For 1 Year	10,62,81,905		7,566	
-For More than 1 Year	9,42,22,032	20,05,03,937	9,42,22,032	9,42,29,598
- Advances for training programs (Suryamitra and others)				
-For 1 Year	72,37,959		-	
-For More than 1 Year	6,42,201	78,80,160	21,56,061	21,56,061
- Recoverable against ITEC Training Programe	14,22,766		-	
- Advance to Vendors	7,07,803		1,02,48,375	
- Balances with Staff (Incl. Imprest Accounts)	2,17,675	23,48,244	1,69,082	1,04,17,457
Gratuity and Leave Encashment Fund				
- Gratuity Fund	79,66,190		-	
- Leave Encashment Fund	81,22,178	1,60,88,368	-	-
Deposits				
- Security Deposits	2,50,262		2,50,262	
- GST (Input Credit and GST Paid on Advance)	3,53,48,415		2,53,73,285	
- TDS Recoverable (FY 2024-25)	1,66,56,550		1,88,27,520	
- Advance Tax/Income Tax Refundable (F.Y. 2014-15)	-	5,22,55,227	16,12,615	4,60,63,682
Total		**1,22,25,13,868**		**1,10,62,56,095**

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SCHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT AS AT 31ST MARCH 2025 — Amount in ₹

SCHEDULE 6- RECEIPTS FROM TESTING AND OPERATIONS	2024-25		2023-24	
		Total		Total
Receipts from Testing				
- Testing of Solar Components	24,58,320	24,58,320	48,48,180	48,48,180
Receipts under ALMM				
- Application Fees	5,15,18,135		3,46,00,670	
- Inspection Fees	5,49,25,000	10,64,43,135	2,83,50,000	6,29,50,670
Other Operational Receipts				
- Receipts from Trainings and Seminars- For Domestic Participants	38,08,207		37,70,591	
-For International Participants	17,25,986		52,36,031	
- Administrative/Overhead Charges	72,98,918		34,89,888	
- Consultancy Fees	2,42,45,930	3,70,79,041	1,30,03,240	2,54,99,750
Total		**14,59,80,496**		**9,32,98,600**

Ajay Gaur & Associates GURGAON Chartered Accountants

NISE गुरुग्राम Gurugram

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 7- GRANTS/SUBSIDIES	2024-25		2023-24	
		Total		Total
Grants Received during the year (Core Grants)	25,55,08,373		18,00,00,000	
Less : Grant Refunded	69,00,201		2,99,91,339	
Add: Grant Unutilised brought forward from Previous year	69,00,201	25,55,08,373	2,99,91,339	18,00,00,000
Grants Received during the year (Project Grants)	23,71,93,942		16,90,15,437	
Less : Grant Refunded	9,45,60,088		7,38,26,086	
Add: Grant Unutilised brought forward from Previous year	9,43,92,202	23,70,26,056	9,69,97,839	19,21,87,190
Grant Adjusted towards Revenue Expenditure :				
Current Year Expenditure-NISE	41,02,15,440		23,36,29,556	
Less : Expenses adjusted towards current year Revenue	5,65,28,565		2,10,01,322	
Less: Provision made against Revenue Expenditure	68,65,337		50,58,839	
	34,68,21,537		20,75,69,395	
Less: Expenses Adjusted against Previous Advances	95,86,835	33,72,34,702	25,67,827	20,50,01,568
Less : Grants utilised for purchase of Fixed Assets	6,46,29,188		6,02,77,427	
Less : Grants utilised for Advances against Capital Expenses	7,35,80,279		95,06,073	
Less : Grants utilised for Advances against projects	1,68,85,856		4,67,100	
Less: Grant utilised for Advance agaist General Expenses	2,02,700	15,52,98,023	30,85,712	7,33,36,312
Grants Payable to Government of India		**1,703**		**9,38,49,310**

Ajay Gaur & Associates GURGAON Chartered Accountants

NISE Gurugram

NATIONAL INSTITUTE OF SOLAR ENERGY

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 8- Interest Earned	2024-25		2023-24	
Bank Interest earned from Revenue	Credited in Revenue	Total	Credited in Revenue	Total
- Interest earned on Saving accounts	1,01,769		57,754	
- Interest earned on Auto Sweep accounts	87,92,015		30,11,180	
- Interest earned on F.D	2,50,25,145		4,60,11,133	
- Interest earned on Corpus Fund	1,32,40,858		1,00,62,557	
Sub Total of Bank Interest	4,71,59,787		5,91,42,624	
Interest on Income Tax Refund	14,76,857	4,86,36,644	15,07,859	6,06,50,483
Bank Interest earned from Grant Accounts				
- Interest earned on Saving accounts	3,72,782		1,21,995	
- Interest earned on Auto Sweep accounts	6,48,512		30,10,373	
- Interest earned on F.D	67,51,267		5,86,510	
- Interest earned on CNA accounts	38,58,730		1,91,81,166	
- Interest earned on Holding accounts	7,424	1,16,38,715	1,87,296	2,30,87,340
Total		**6,02,75,359**		**8,37,37,823**

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 9- OTHER INCOME	2024-25		2023-24	
	Credited in Revenue	Total	Credited in Revenue	Total
Miscellaneous Income				
- Guest House Charges	15,08,954		7,01,100	
- Sale of Scrap Material	85,60,003		-	
- Processing Fees	54,71,620		-	
- Other Income	76,538	1,56,17,115	3,04,093	10,05,193
Provision & Expenditure Written Back	13,83,718	13,83,718	5,41,441	5,41,441
Total		**1,70,00,833**		**15,46,634**

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SHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 10- ESTABLISHMENT EXPENSES	2024-25					2023-24				
	Adjusted with grant	Adjusted against Advances	Provision for Expenses	Charged to Revenue	Total	Adjusted with Grant	Adjusted against Advances	Provision for Expenses	Charged to Revenue	Total
Consultancy Charges (Contractual Manpower)	* 2,46,773	-	-	76,37,698	78,84,471	15,28,580	-	-	33,75,433	49,04,013
Remuneration (Regular Employees)	5,48,77,300	13,980	-	24,42,165	5,73,33,445	4,49,86,020	-	-	40,17,173	4,90,03,193
Contribution to Gratuity Fund	-	-	-	79,66,190	79,66,190	-	-	-	-	-
Contribution to Leave Encashment Fund	-	-	-	81,22,178	81,22,178	-	-	-	-	-
Total	5,51,24,073	13,980	-	2,61,68,231	8,13,06,284	4,65,14,600	-	-	73,92,606	5,39,07,206

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SHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 11- OTHER ADMINISTRATIVE EXPENSES	2024-25					2023-24				
	Adjusted with grant	Adjusted against Advances	Provision for Expenses	Charged to Revenue	Total	Adjusted with Grant	Adjusted against Advance	Provision for Expenses	Charged to Revenue	Total
Electricity and Fuel Expenses	56,99,458	-	4,97,036	-	61,96,494	42,06,208	-	4,64,891	-	46,71,099
Outsourced Services	2,80,43,203	-	36,16,803	45,73,694	3,62,33,700	2,57,20,562	-	26,12,875	31,26,868	3,14,60,305
Security Services	1,15,63,888	-	15,31,168	20,14,342	1,51,09,398	1,18,14,519	-	12,61,710	7,97,080	1,38,73,309
IT Manpower Services	-	70,86,050	-	9,28,107	80,14,157	-	-	-	-	-
Training Expenses	-	-	-	7,36,007	7,36,007	-	-	-	12,02,818	12,02,818
Miscellaneous Exp./Contingency	-	-	-	65,021	65,021	-	-	-	10,51,466	10,51,466
Office Expenses	17,57,699	22,200	-	4,90,559	22,70,458	6,92,249	-	-	2,38,440	9,30,689
Sports/Gym Expenses	2,29,281	-	-	1,26,580	3,55,861	-	-	-	-	-
Annual Day/Festival Celebration Expense	18,22,660	-	-	4,07,143	22,29,803	-	-	-	-	-
Refreshment/Hospitality	10,62,090	-	4,97,188	1,80,974	17,40,252	7,17,777	-	26,572	-	7,44,349
Exhibition & Promotion Expense	9,73,992	-	-	15,60,002	25,33,994					
Legal & Professional Charges	10,59,488	8,85,000	11,505	6,18,007	25,74,000	6,41,138	-	87,910	-	7,29,048
Auditor's Remuneration	1,29,800	-	51,920	-	1,81,720	-	-	-	-	-
Bank Charges	6,035	-	-	6,324	12,359	1,236	-	-	89,900	91,136
Gateway/Service charges	-	-	-	26,535	26,535	-	-	-	90,004	90,004
Horticulture Expenses	-	-	-	1,69,491	1,69,491	36,63,466	-	2,00,000	3,04,122	41,67,588
Advertisement Expenses	-	31,869	-	-	31,869	-	1,03,191	-	-	1,03,191
Guest House Expenses	-	-	-	5,44,389	5,44,389	-	-	-	83,616	83,616
IT Expenses (Facilitation Charges)	6,40,970	15,999	-	8,59,121	15,16,090	14,33,556	-	-	-	14,33,556
Seminars/Conferences/Training Programmes	2,12,674	-	-	3,63,419	5,76,093	84,506	-	-	3,06,494	3,91,000
Medical Reimbursement	-	-	4,29,501	8,02,594	12,32,095	-	-	1,88,889	4,40,337	6,29,226
Lab Expenses	54,02,928	-	-	11,91,565	65,94,493	8,86,643	-	-	-	8,86,643
Consumables/ Laboratory/Workshop Exp.	-	-	-	57,958	57,958	-	-	-	2,84,639	2,84,639
Electrical Consumables	12,42,733	-	-	1,27,473	13,70,206	1,76,581	-	-	71,403	2,47,984
Library Books, Periodicals and News paper	35,617	-	-	1,32,193	1,67,810	1,27,081	-	771	-	1,27,852
Postage , Courier, Printing and Stationery	12,65,486	-	-	68,056	13,33,542	6,64,596	-	-	44,619	7,09,215
Standard Subscription Exps. (Annual)	-		-	-	-	1,20,855	-	-	-	1,20,855
Recuritment Expenses	-	-	-	3,61,500	3,61,500	-			17,986	17,986
Interest & Penalty	-	-	-	-	-	-	-	-	859	859
Repairs & Maintenance Expenses (Building, Machinary & Computers)	22,29,348	1,600	-	-	22,30,948	8,80,821	24,700	-	13,873	9,19,394
Telephone & Lease line Expenses	31,70,424	-	29,264	2,55,426	34,55,114	27,24,411	-	29,264	2,26,089	29,79,764
Vehicle Running & Maintenance	2,31,122	-	6,547	28,340	2,66,009	2,56,810	-	44,771	-	3,01,581
Hiring of Vehicles Expenses	17,09,327	-	1,94,405	-	19,03,732	13,21,206	-	1,41,186	1,44,151	16,06,543
Tour / Travel & Transport	9,34,322	16,277	-	14,95,047	24,45,646	9,35,870	18,000	-	12,99,883	22,53,753
Tour / Travel & Transport- International	1,42,460	-	-	-	1,42,460	18,182	-	-	-	18,182
Tour / Travel & Transport-ALMM	-	-	-	37,32,093	37,32,093	-	-	-	29,52,727	29,52,727
Board & Committee meeting	1,16,595	-	-	69,482	1,86,077	1,14,280	-	-	-	1,14,280
Scrap Meterial -Expenses	-	-	-	82,43,283	82,43,283	-	-	-	-	-
Total	**6,96,81,600**	**80,58,995**	**68,65,337**	**3,02,34,724**	**11,48,40,656**	**5,72,02,553**	**1,45,891**	**50,58,839**	**1,27,87,374**	**7,51,94,657**

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SHEDULES FORMING PART OF INCOME AND EXPENDITURE ACCOUNT AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 12- OPERATIONAL/PROJECTS EXPENSES	2024-25					2023-24				
	Adjusted with grant	Adjusted against Advances	Provision for Expenses	Charged to Revenue	Total	Adjusted with Grant	Adjusted against Advance	Provision for Expenses	Charged to Revenue	Total
Released to State Nodal Agencies/ Training Partners for Skill Development Programme	21,06,98,558	15,13,860	-	-	21,22,12,418	8,47,98,222	24,21,936	-	-	8,72,20,158
ITEC Training Programe Expenses	-	-	-	1,25,610	1,25,610	1,40,47,029	-	-	4,45,285	1,44,92,314
Hydrogen Project Expenses	-	-	-	-	-	4,07,032	-	-	-	4,07,032
Department of Science and Technology Project Expenses	17,30,471	-	-	-	17,30,471	20,32,132	-	-	-	20,32,132
UNICEF Project Expenses	-	-	-	-	-	-	-	-	3,76,058	3,76,058
Total	**21,24,29,029**	**15,13,860**	**-**	**1,25,610**	**21,40,68,499**	**10,12,84,415**	**24,21,936**	**-**	**8,21,343**	**10,45,27,694**

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SCHEDULES FORMING PART OF BALANCE SHEET AS AT 31ST MARCH 2025

Amount in ₹

SCHEDULE 13- Interest Expenses	2024-25		2023-24	
		Total		Total
Interest expenses on Grant Accounts				
- Interest on Grant Accounts expense	77,10,988	77,10,988	37,18,878	37,18,878
Bank Interest expenses from CNA Accounts				
- Interest expenses on CNA accounts	39,27,727	39,27,727	1,93,69,041	1,93,69,041
Total		**1,16,38,715**		**2,30,87,919**

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STATEMENT OF GRANTS FOR THE FINANCIAL YEAR 2024-25

Amount in ₹

PARTICULARS	Opening Balance 01.04.2024	Refund/Transfer during the year 2024-25		Receipt/Transfer during the year 2024-25		Utilization against advances 2024-25	Utilization against Fixed Assets 2024-25	Utilization against Revenue Expenses 2024-25	Utilization against Admin Charges 2024-25	Total Utilization 2024-25	Closing Balance 2024-25
National Institute of Solar Energy		Refund to Ministry	Transfer	Received in Bank	Received Through Transfer						
Grant for Creation of Capital Assets	37,03,066	37,03,066	-	13,05,00,000	-	7,35,80,279	5,69,18,018	-	-	13,04,98,297	1,703
Grant in aid- General	31,97,135	31,97,135	-	7,00,00,000	8,373	80,000	-	6,99,28,373	-	7,00,08,373	-
Grant in aid- Salaries	-	-	-	5,50,00,000	-	1,22,700	-	5,48,77,300	-	5,50,00,000	-
Grant for BHEL R&D Projects (P01- PERC)	7,35,610	-	7,35,610	-	-	-	-	-	-	-	-
Grant for Project Hydrogen (P02- Hydrogen)	95,92,969	95,92,969	-	69,75,000	-	-	69,75,000	-	-	69,75,000	-
Grant- Skill Development Programme (HRD-4110)	5,37,15,896	5,37,15,896	-	21,76,59,159	-	69,60,601	-	20,43,85,466	63,13,092	21,76,59,159	-
Grant for SERIIUS (Indo US Project)	39,666	-	39,666	-	-	-	-	-	-	-	-
Grant- World Renewal Energy Muesum	2,66,55,548	2,66,55,548	-	-	-	-	-	-	-	-	-
Grant- Solar Powered clean drinking water project (P03-SDWP)	-55,002	-	-55,002	-	-	-	-	-	-	-	-
Grant - Varunmitra Skill Development Programme (HRD-4110)	38,75,401	38,75,401	-	-	-	-	-	-	-	-	-
Grant - Department of Science & Technology (P06- WPDST-2)	-1,67,886	-	-	1,25,59,783	-	99,25,255	7,36,170	12,30,472	5,00,000	1,23,91,897	-
Total Grant (Balance of Grant payable to Govt. of India)	**10,12,92,403**	**10,07,40,015**	**7,20,274**	**49,26,93,942**	**8,373**	**9,06,68,835**	**6,46,29,188**	**33,04,21,611**	**68,13,092**	**49,25,32,726**	**1,703**
Contributions for Corpus Fund											
Contribution by IREDA	1,00,00,000	1,00,00,000	-	-		-	-	-		-	-
Total Grant Received from Govt. Non-Refundable	**1,00,00,000**	**1,00,00,000**	-	-		-	-	-		-	-

Ajay Gaur & Associates SURGAON Chartered Accountants

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SCHEDULE 14

SIGNIFICANT ACCOUNTING POLICIES AND NOTES TO ACCOUNTS FORMING INTEGRAL PART OF THE FINANCIAL STATEMENTS FOR THE F.Y 2024-2025.

A. SIGNIFICANT ACCOUNTING POLICIES

1. Accounting Convention

The financial statements are prepared on the basis of historical cost convention, unless otherwise stated and on the basis of accrual method of accounting.

2. Grant in Aid

a) The Institute is getting budgetary support from Ministry of new & Renewable Energy, Government of India. These grants are recurring in nature and are termed as Core Grants. Besides the recurring grants, one-time grants are also received to take up specific projects or activities. Such grants have been classified as Project Grants. The unutilized grants at the end of year have been shown in the financial statements as Grant Payable to Government of India. Grants which are non-refundable are shown as corpus fund under General Reserve.

b) Grants related to Revenues are credited in the Income and Expenditure Statement and Grants utilized for purchase of fixed assets are transferred to Capital Reserve Fund.

c) The Institute has adopted the policy to set off allocable revenue expenses with the internally generated resources i.e., testing, training and Consultancy income in accordance with Rule 229 (iv) of GFR, 2018. The surplus from the same is being shown under the head General Reserve. However, expenses incurred against specific projects and activities have been set off against the grants received for that purpose.

3. Fixed Assets and Depreciation

a) Fixed assets are stated at cost of acquisition inclusive of inward freight, duties and taxes and incidental and direct expenses related to acquisition.

b) Assets costing Rs. 5,000/- or less are fully provided for in the year of Purchase as per the uniform format of Accounts for Central Autonomous Bodies from the year 2001-2002.

c) Depreciation has been provided on written down value method as per rates prescribed under Income Tax Act 1961.

d) The fixed assets are funded by the GCCA- Capital and hence, the charge of depreciation over the same is being recognised as a contra item in Income & Expenditure Account.

4. Employee Remuneration & Retirement Benefits

a) NISE has taken a Group Gratuity Policy with Life Insurance Corporation of India to cover the Gratuity benefit payable at the retirement of regular employees. The contribution payable for the year towards the policy is charged off to revenue. Gratuity fund as well as provision for gratuity is created in the Current assets and Current Liability respectively in Balance sheet.

b) NISE has taken a Leave Encashment Policy with Life Insurance Corporation of India to cover the Leave Encashment benefit payable at the retirement of regular employees. The contribution payable for the year towards the policy is charged off to revenue. Leave Encashment fund as well as provision for leave Encashment is created in the Current assets and Current Liability respectively in Balance sheet.

5. Revenue Recognition

Revenue is recognized on accrual basis.

6. Uniform Format of Accounts for Central Autonomous Bodies

The accounts are prepared in line with the Uniform Format of Accounts for Central Autonomous Bodies from the year 2001-2002.

B. Notes to Accounts

1. NISE has created the Corpus Fund from the internal generated revenue as per the guidelines approved by MNRE vide letter No. 354/12/2017 – NSM dated 24.06.2019 during the year. The balance of Corpus Fund including Interest less TDS as on 31.03. 2025 is Rs. 2711.98/- lakhs (Previous year Rs. 1981.34/-).

2. The guidelines for enlistment under "Approved Models and Manufactures of Solar Photo voltaic Modules (Requirements for Compulsory Registration) Order, 2019" issued by MNRE, NISE has been designated as Implementation Support Agency. The inspection/application fee under the said scheme is considered as revenue of the Institute.

3. The accumulated depreciation amounting to Rs. 69,33,47,140/- (current year Rs. 8,35,84,350/-) has been charged to the Income & Expenditure account. Since the Institute is fully aided by the grant from Government of India, the same has been charged to the Grant in Aid (Capital) and is recognised in the Income & Expenditure account as a contra item.

4. The amount of interest earned on grants and payable to MNRE is Rs. 1,16,38,715/- (previous year Rs. 2,30,87,919/-) and has been shown as Income as well as Expenditure in Income and Expenditure account.

5. The Institute has taken over the facilities consisting of 200 acres of land, administrative block, 3 Nos. technical block from erstwhile solar Energy centre (MNRE), the ownership of which is under process of transfer.

6. Addition made during the F.Y. 2024-25 in Capital Reserve (Purchase of Assets) amounting to Rs. 6,81,50,711/- (Previous Year Rs. 6,02,77,427/-).

7.The provision for expenses during the year has been made for an amount of Rs. 68,65,337/-(Previous year Rs 50,58,839/-).

8. An amount of Rs. 11,54,454/- out of the provision made in F.Y. 2023-24, has been written back during the year, as the same has been paid through the grant account.

9. The balances of sundry creditors and debtors are subject to confirmation.

10. Previous year figures have been regrouped and rearranged to make them comparable with those of current year.

11. The figures shown in the accounts are rounded off to the nearest rupee.

12. The NISE has opened 02 no. of Letter of Credit (LC) during the FY 2024-25 with the SBI as under:-

Sr.no.	Vendor Name	LC Value
1.	Spectralytic Scientific India Pvt Ltd.	Rs. 1,18,68,062/- (90% of Invoice Value)
2.	Photo Emission Tech. Inc.	USD 1,30,950/- (90% of Invoice Value)

For M/S Ajay Gaur & Associates,
Chartered Accountants
(FRN:013124C)

Ajay Gaur & Associates GURGAON Chartered Accountants

(CA Kailash Daga)
Partner
M. No. 432247
UDIN: 25432247BMJNSS7491
Place: Gurugram
Dated: August 19, 2025

NISE Gurugram

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RECEIPT AND PAYMENT ACCOUNT FOR THE YEAR ENDED ON 31ST MARCH 2025

Amount in ₹

RECEIPT	2024-25	2023-24	PAYMENT	2024-25	2023-24
Opening Bank Balances			**Statutory Liabilities**		
-In Saving bank accounts	1,71,07,179	9,61,428	-Goods and service tax	3,55,04,127	1,77,70,549
-In Sweep accounts	11,53,83,638	12,18,38,208	-TDS under Income Tax	3,01,61,534	1,22,52,884
-In Current bank accounts	39,995	7,08,784	-TDS Under GST	30,28,760	17,32,018
-In CNA accounts	14,65,33,625	65,76,54,009	-TCS under Income Tax	85,600	-
			-National Pension Scheme & GIS	89,64,300	76,29,473
			-EPF Contribution	1,92,517	-
Grant Received During the Year					
Grant in Aid - General, Salary and Capital	25,55,00,000	18,00,00,000	**Salary Expenses**		
Grant - Suryamitra Program	21,65,00,000	15,46,11,461	-Salary to Contractual Manpower (Net)	68,04,733	65,99,645
Grant - DST Project	1,25,59,783	43,01,297	-Salary to Regular Employees (Net)	4,06,85,256	3,48,30,254
Grant - Hydrogen Project	69,75,000	-			
Grant - International Training Programme	82,28,528	1,36,76,032	**Deposit and Advances**		
			Advance to CPWD	5,71,28,494	60,19,507
Received From Debtors			Refund of EMD	31,63,803	9,97,200
-Receipt For Guest House	15,38,360	9,59,945	Refund of UNICEF	2,42,112	-
-Receipt From Processing Fees	2,10,000	48,000	Refund of Security Deposit	1,04,100	1,77,432
-Receipt From Testing Service	97,89,786	53,55,990			
-Receipt From Consultancy Service	2,92,34,560	1,31,03,931	**Payments from CNA Account**		
-Receipt From Trainings	41,80,327	45,13,357	HRD Scheme-4110	5,23,58,114	5,17,35,805
-Receipt From ALMM	17,31,23,380	14,57,18,388	R&D Scheme- 4112	28,77,21,887	30,86,39,070
-Receipt From Sale of Scrap	81,57,684	-			
-Others	31,308	15,000	**Refund to Ministries/Others**		
			Refund of Grant and Interest to MNRE	15,34,87,641	34,09,62,145
			Refund to PAO DST	0	4,84,603
Deposits and Advances			Refund to MNRE against Sale of Scrap	73,87,283	-
-Receipt For ISA Fellowship Prog.	40,00,000	-	Refund to SERB	15,250	6,64,684
-Utility Charges from ISA	84,23,483	-	Refund to IREDA (Award fund)	1,51,11,480	-
-Earnest Money Deposit	38,31,900	7,52,183	Refund to IREDA (World Museum)	4,04,61,452	-
-Security Deposit	73,000	1,51,640			
-SERB	85,000	-	**Payment to Creditors**		
-IIT Delhi	1,28,000	-	Payment to Creditors of Capital Goods	11,59,16,754	6,07,40,732
			Payment to Creditors of Goods and Services (Administrative Exps)	9,05,90,989	8,89,01,497
Interest Received					
-Interest on Income Tax Refund	14,76,857	15,07,859	**Payment under ISA Fellowship**	80,68,235	1,79,35,068
-Bank Interest on Revenue	82,84,100	29,68,644	**Creation of Fixed Deposit**	31,91,85,849	34,29,77,605
-Interest on CNA Account	38,66,154	1,93,68,462	**Payment under Suryamitra Program**	19,09,07,508	7,68,96,515
-Interest on Saving Bank Grant	3,74,890	1,26,093			
-Interest on Sweep	12,56,088	34,53,676	**Refund of Fees**		
			Refund of Recuritment fees	3,61,500	-
Receipts From Fixed Deposit (On Maturity)	17,27,13,218	33,14,20,117	Refund of Testing Fees	4,85,149	3,52,352
			Refund of Consultancy Fees (Unicef)	-	30,000
Amount Received in CNA Account for Further Assignment of Fund			Refund of Training Fees	54,752	27,342
-HRD Scheme -4110	5,82,46,457	7,01,93,128	Refund of ALMM Fees	2,38,987	9,06,67,627
-R&D Scheme - 4112	28,77,44,301	1,96,00,000			
			Others		
Refund From Income Tax	2,00,82,909	21,66,219	Misc. Payments (Bank Charges)	2,75,354	2,048
			TDS Deduction by bank	8,86,742	7,06,015
Received from staff against adjustment of advances	1,42,441	3,44,355	Tour & Travel - Staff (ALMM and others)	59,03,094	42,24,392
			ITEC training program	-	25,00,425
Other Receipts	24,608	3,116	Contribution towards Gratuity & Leave Encashment (Paid to LIC)	1,60,88,368	-
			Closing Bank Balance		
			-In Saving bank accounts	3,05,98,701	1,71,07,179
			-In Sweep accounts	4,26,24,477	11,53,83,638
			-In Current bank accounts	25,556	39,995
			-In CNA accounts	1,10,26,102	14,65,33,625
Total	**1,57,58,46,560**	**1,75,55,21,325**	**Total**	**1,57,58,46,560**	**1,75,55,21,324**

As Per Our Audit Report of Even Date
For M/s Ajay Gaur & Associates
Chartered Accountants
(FRN- 013124C)

(CA Kailash Daga)
(Partner)
M. No. 432247
UDIN: 25432247BMJNSS7491
Place: Gurgaon
Date: 19.08.2025

Ajay Gaur & Associates GURGAON Chartered Accountants

For NATIONAL INSTITUTE OF SOLAR ENERGY

(Dr. Chandan Banerjee)
Dy. Director General

(Dr. Mohammad Rihan)
Director General

NISE गुरुग्राम Gurugram


सौर पीवी मॉड्यूल परीक्षण
और अंशांकन प्रयोगशाला
SOLAR PV MODULE TESTING
AND CALIBRATION LAB
राष्ट्रीय सौर ऊर्जा संस्थान
NATIONAL INSTITUTE OF SOLAR ENERGY
(नवीन और नवीकरणीय ऊर्जा मंत्रालय, भारत सरकार का स्वायत संस्थान)
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National Institute of Solar Energy

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